Common Plants
of the Western Rangelands

Volume 3
Forbs

OLDS COLLEGE

Alberta
AGRICULTURE, FOOD AND
RURAL DEVELOPMENT
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Kathy Tannas

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"Everything lives by a law; a central balance sustains all."
-C.L. Von Kuebell

"But now ask the beasts,
and let them teach you;

And the birds of the heavens,
and let them tell you.

"Or speak to the earth, and
let it teach you;

And let the fish of the sea
declare to you.

"Who among all these does
not know

That the hand of the Lord
has done this."
-Job 12:7-9

"In Nature's infinite book of secrecy
A little I can read."
-Shakespeare

Introduction

The content as well as style and format of this book have been designed for all those with an interest in the plants that occupy our western rangelands - students, professional staff, ranchers and farmers, as well as the amateur botanist whose interest is purely recreational.

Plant Identification Component

An attempt has been made to simplify terminologies used to describe and identify the various plant species, but, at the same time, to include enough taxonomic detail to adequately separate one species from the next. To accomplish this, a number of strategies were combined - the use of bold print to "short-cut" identification, thus emphasizing only key identifying characteristics; the addition of line drawings as visual aids; the simplification and inclusion of habitat/distribution considerations in plant keys. This process of simplification created the problem of where to "draw the line" in eliminating certain species from the text. With something like 1800 vascular plants in Alberta alone, it was necessary to focus only on those species most commonly encountered in our rangelands. These include, in some cases, those that dominate in a single ecoregion but are rarely found elsewhere, and alternately, plants that seldom form dominant cover but have a widespread distribution throughout all ecoregions. In addition to the native species composition, a number of non-native plants have been described. Many of these are important forage species, others are very aggressive and are either currently threatening our rangelands, or have the potential to do so. By necessity, difficult groups - sedges, rushes, willows - were given less emphasis, with only the most well known and widespread species receiving mention (complete species lists and descriptions for the various ecoregions can be found in a number of complete taxonomic texts).

Habitat and Distribution Component

In this component, each species is assigned to the ecoregion(s) where it is most commonly encountered, and its typical habitat is identified. It is within this second, or habitat, category that correlations can often be made between an individual species and an ecosite type (or successional phase). When this relationship between a species and its habitat is consistent and predictable, it is known as an indicator of a specific ecosite. The presence of black spruce/ Labrador tea, for example, indicates a more or less hygric, acidic site, whereas significant cover of kinnikinnick/buffalo-berry in western regions reflects a subxeric moisture regime. Conversely, in the case of difficult genera such as sedges and willows, ecosite characteristics can become a tool to verify a plant species' identity by incorporating habitat clues into a key. By using this species association technique, a sedge such as *Carex vaginata* would be associated with a hygric (often Labrador tea) community, just as *Carex stenophylla* or *siccata* reflect a subxeric environment.

Forage Value/Grazing Response/Notes Component

The primary purpose of the "Forage Value" section is to discuss the value of each plant species to livestock and wildlife. The value of a given species may vary, depending upon a number of factors such as season of use, habitat and availability and abundance of alternative forage. Thus, while relished by livestock in one area, the same species may be utilized sparingly when growing in another plant community. The term "Grazing Response" can be defined as the reaction of a given species when it is grazed. Although generalizations as to grazing response can usually be made, this reaction can sometimes vary from one microclimate and soil zone to the next. Thus, a plant may be an increaser in one region, but tend to decrease under a different combination of environmental conditions.

The final "Notes" component, by intention, is very brief, highlighting economic, aboriginal and medicinal uses of the plants. As well, most species are discussed briefly in terms of their importance in providing ground cover, potential for erosion control and any aesthetic appeal they may have.

The rangelands represented in this text are an intricate complex of plant communities, each of these a unique combination of grass and grass-like, forb and shrub species. The complexity in vegetation composition varies significantly from one area to the next. In the prairies, for example, it can be very simple, comprised of three or four major grasses and a few forbs, and will remain fairly stable and predictable until a major change in range type occurs. On the other extreme, such as can be found in the lush grasslands of the foothills region, it is not uncommon to encounter 35 or more species in a 100 m. vegetation transect, and this specific composition changing considerably throughout a relatively small geographical area.

Grasses/Grass-like Species

Grasses are by far our most valuable forage plants, in well managed pastures comprising up to 90% of the total grazing. Many are highly palatable, and their decrease in vigor and prominence correlates to deterioration in range condition. Bunch grasses, in particular, are sensitive to over utilization. They lack the option to reproduce vegetatively to any extent, and many, although producing abundant leafy growth, are poor seed producers. Grass-like species on the other hand, although members of large and diverse families, generally provide relatively small amounts of forage. Certain sedges and rushes are palatable, and in some localized situations, do rate among the most prominent species, and as such, are of some significance.

Forbs

Forbs are the best known and most easily identified members of the plant kingdom. From a rangeland perspective, however, most produce inferior quantities of forage, also do not have the curing properties characteristic of many native grasses. Most forbs increase with grazing pressure, their abundance an indicator of deteriorated range condition. Contained within this group are a number of species toxic to livestock. With the exception of larkspur, most of these are unpalatable and seldom ingested in any quantity under normal conditions. Also important are members of the legume family, most of which have the ability to fix atmospheric nitrogen. Some legumes produce large amounts of nutritious forage, others are poisonous, thus considered undesirable range species.

Trees and Shrubs

Trees and shrubs vary greatly in prominence from one ecoregion to the next. In the prairie region, they usually comprise a very small percentage of the vegetation cover, in other ecoregions form a large part of the plant community. Forage value also varies greatly, a few known to be toxic, many unpalatable and worthless to livestock and game, others highly nutritious and palatable, often relied upon exclusively as winter forage. In all ecoregions shrub and tree components are valued as cover and habitat for wildlife. As a whole, woody species are persistent and relatively aggressive, thus have the potential to increase as range condition deteriorates.

The Ecoregions

Rangelands, by definition, are those areas which are conducive to utilization by livestock and game. Although most ecoregions provide forage and habitat to some extent, this text deals with primary and secondary rangelands, thus eliminating peripheral regions in the extreme north as well as alpine areas.

Within our western rangelands, six major ecoregions will be discussed, their boundaries determined by environmental and ecological means rather than by political. Definition of these boundaries can be somewhat obscure, with transitional vegetation zones and exceptions to the rule not uncommon occurrences. For example, growing side by side on a bank in south Calgary are both plains rough fescue (*Festuca hallii*) and foothills rough fescue (*Festuca campestris*) both distinct and without apparent hybridization. Blue grama (*Bouteloua gracilis*) can be found in abundance on exposed, sandy slopes in the foothills region, needle and thread (*Stipa comata*) and Indian rice grass (*Oryzopsis hymenoides*), although primarily species of the prairies, are present in all ecoregions on suitable sites.

Within each region, numerous range sites, or ecosite types, can be identified, each of these with its own unique indigenous vegetation community which is best adapted to the specific climate and soil conditions. Over time, the natural process known as plant succession occurs, and the pioneer species that dominate initially will be replaced by climax vegetation. This perfect or "bench mark" plant community that develops, unless disturbed or abused, remains relatively stable and self-sustaining. Within a given rangeland, various successional stages can usually be recognized, influenced by such factors as uneven livestock and game distribution patterns, mechanical disturbance and natural occurrences such as fire and flooding. The result is a complex mosaic of plant communities and a highly diverse ecosystem. In cases where prolonged and excessive abuse or disturbance has negatively impacted soil conditions and depleted the seed supply, this successional process can proceed very slowly. With less severe disturbance, natural succession can develop relatively quickly.

1. The Prairie Region

The prairie occurs in the Brown soil zone of southeastern Alberta and adjacent areas eastward and to the south, also in the drier portions of the Dark Brown soil zone in these regions. Most productive soils are predominantly Chernozemic, the primary factor limiting plant growth in this area is the low annual precipitation (averaging about 300 mm.). As well, atmospheric temperatures are higher than in the other mentioned ecoregions. In the driest sites, upland grasslands are dominated by low growing, drought resistant species - needle and thread (*Stipa comata*), June grass (*Koeleria macrantha*), blue grama (*Bouteloua gracilis*) and such forbs as moss phlox (*Phlox hoodii*) and scarlet mallow (*Sphaeralcea coccinea*). Northern wheat grass (*Agropyron dasystachyum*) occupies the drier sites, western wheat grass (*Agropyron smithii*) preferring slightly moister and alkaline/saline habitats.

A common range type found in this ecoregion consists of Solonetzic soils, where hard clays restrict water absorption and root penetration. Species common on these sites are tolerant of moderate salt and alkali accumulations (for example, Sandberg bluegrass - *Poa sandbergii*, Nuttall's alkali grass - *Puccinellia nuttalliana*, and gumweed - *Grindelia squarrosa*). More highly saline and alkaline situations are frequent around sloughs and lakes, and vegetation composition is limited to a few species adapted to these extreme conditions (i.e. salt grass - *Distichlis stricta*, prairie bulrush - *Scirpus paludosus*, and samphire - *Salicornia europaea*).

Sandy Regosolic soils, often producing rolling landscapes, are common throughout the prairies. Grasses such as Indian rice grass (*Oryzopsis hymenoides*) and sand grass (*Calamovilfa longifolia*) dominate, and shrub cover is often higher due to increased potential for root penetration and/or an elevated water table. Badland breaks, often calcareous by nature, support species like plains muhly (*Muhlenbergia cuspidata*) and thread-leaved sedge (*Carex filifolia*), and higher moisture regimes are transitional to such grasses as green needle grass (*Stipa viridula*) and western porcupine grass (*Stipa curtiseta*). Extensive shrub and tree cover is generally restricted to coulees, snow melt areas and along waterways, also to sandy areas with an elevated water table.

2. The Parkland Ecoregion

This region is located in the Dark Brown soil zone, also transitional to the Black soil zone northward. Chernozemic soils dominate on mesic sites, Luvisolic under tree canopies, Regosols in some sandy sites, and Gleysols in subhygric areas. Annual precipitation is somewhat higher than in the prairie region (averaging about 350-400 mm.) and temperatures are slightly lower. The parkland is a patchwork of open grasslands alternating with aspen groves, and dotted with small lakes and wetlands, these frequently surrounded by shrubby growth such as willows (*Salix* species) and gooseberry (*Ribes oxyacanthoides*). Climax grasslands are dominated by plains rough fescue (*Festuca hallii*), with minor components such as western porcupine grass (*Stipa curtiseta*), Hooker's oat grass (*Helictotrichon hookeri*) and awned wheat grass (*Agropyron trachycaulum* var. *unilaterale*). Wooded areas are a mixture of buckbrush (*Symphoricarpos occidentalis*) and aspen (*Populus tremuloides*) which, over time, develop an understory comprised of such species as bluejoint (*Calamagrostis canadensis*), awned wheat grass and Kentucky bluegrass (*Poa pratensis*). Encroachment of aspen onto the fescue grasslands is of primary concern to both ranchers and ecologists alike.

Also included as a somewhat transitional zone between the parkland and southern boreal forest is the rather unique Peace River district. It is typically warmer and drier than other regions at this latitude, being parkland-like with shrubby areas (saskatoon - *Amelanchier alnifolia* and wild cherries - *Prunus pensylvanica* and *virginiana*), aspen groves and open grasslands. Vegetation in the mesic grasslands includes needle grasses (*Stipa columbiana* and *viridula*), June grass (*Koeleria macrantha*) and wheat grasses (*Agropyron* species), while exposed and eroded slopes closely resemble drier portions of the parkland region.

Many range types occur throughout the parkland, the sandy Regosolic sites with a high sand grass (*Calamovilfa longifolia*) component, Solonetzic soils which are typically less productive, and saline depressional areas dominated by such species as Nuttall's alkali grass (*Puccinellia nuttalliana*), salt grass (*Distichlis stricta*) and alkali cord grass (*Spartina gracilis*).

3. The Foothills Ecoregion

The foothills region lies to the west of the prairies and intergrades into montane communities to the north and west. Soils are predominantly Black Chernozems in mesic grasslands, transitional into Dark Grey and Dark Grey Luvisols or Brunisols in wooded areas. Annual precipitation is relatively high, between 380 & 460 mm., and mean temperatures are lower than in the prairie and parkland regions. Grasslands in the foothills are characteristically our most diverse and complex, and vary significantly with microclimatic changes. As well, because moisture and soil conditions are usually favorable, rangelands are generally highly productive.

Mesic open sites are dominated by foothills rough fescue (*Festuca campestris*) with minor components such as Kentucky bluegrass (*Poa pratensis*), awned wheat grass (*Agropyron trachycaulum* var. *unilaterale*) and intermediate oat grass (*Danthonia intermedia*). On somewhat drier sites, Parry oat grass (*Danthonia parryi*) is often prominent, with Idaho fescue (*Festuca idahoensis*), June grass (*Koeleria macrantha*) and northern wheat grass (*Agropyron dasystachyum*) also increasing. On xeric, exposed sites the vegetation community will be composed of such species as bluebunch wheat grass (*Agropyron spicatum*), June grass and dryland sedges.

Shrub cover in much of the ecoregion is significant, as is the encroachment of aspen (*Populus tremuloides*) on suitable sites. Early successional woody species include green alder (*Alnus crispa*), birch (*Betula* species), lodgepole pine (*Pinus contorta*), Scouler's willow (*Salix scouleriana*), and in some locations, Douglas fir (*Pseudotsuga menziesii*). Old growth forests are dominated by white spruce (*Picea glauca*), with a rather sparse understory cover, including pine grass (*Calamagrostis rubescens*), hairy wild rye (*Elymus innovatus*), cranberry and blueberry (*Vaccinium* species), heart-leaved arnica (*Arnica cordifolia*) and bunchberry (*Cornus canadensis*).

The Cypress Hills is a disjunct fescue grassland situated in southeastern Alberta and southwestern Saskatchewan. It interrupts the prairie landscape by rising to an elevation of over 1300 m. Soils in the region are good, and increases in precipitation (to about 400 mm. or more annually) correlate with the higher elevation. The prairie vegetation on the lower slopes graduates into rough fescue grasslands (both *Festuca campestris* and *Festuca hallii* and also suspected hybrids between the two). Land forms are varied, consisting of rolling hills, terraces, numerous wetlands, ravines and shrubby thickets including such species as saskatoon (*Amelanchier alnifolia*), willows (*Salix* species) and hawthorn (both *Crataegus douglasii* and *rotundifolia*). Highest elevations and north facing slopes are dominated by tree cover, the aspen and lodgepole pine forests ultimately replaced by white spruce. Productivity, species composition and diversity are comparable to that of the foothills ecoregion.

4. The Boreal Forest

The boreal forest is a vast, extensive area situated north of the parkland ecoregion. The southern portion is transitional to the parkland, dominated by Grey, Dark Grey and Dark Grey wooded soils. Annual precipitation varies between 400 and 480 mm. This region characteristically has numerous wetlands where sedges (*Carex* species), cotton grasses (*Eriophorum* species), manna grasses (*Glyceria grandis* and *borealis*) and reed grasses (*Calamagrostis stricta* and *inexpansa*) are prominent.

Upland soils are predominantly Brunisols and Luvisols, and are often sandy in nature, supporting such woody species as green alder (*Alnus crispa*), aspen (*Populus tremuloides*) and jack pine (*Pinus banksiana*). Understory vegetation includes short-awn rice grass (*Oryzopsis pungens*), awned and slender wheat grass (*Agropyron trachycaulum* var. *unilaterale* and var. *trachycaulum*) and blueberry (*Vaccinium myrtilloides*).

If left undisturbed, mesic sites are dominated by forests, cover values of individual species varying in response to changes in microclimate, aspect, slope and soils. Most common are aspen, balsam poplar, with paper birch (*Betula papyrifera*) and birch hybrids in some locations, and often white spruce at late successional phases. Understory shrubs include rose (*Rosa acicularis*), low-bush cranberry (*Viburnum edule*), alder, red osier dogwood (*Cornus stolonifera*) and occasionally hazelnut (*Corylus cornuta*).

The northern boreal forest can, as a whole, be classed as less productive rangeland. Soils are predominantly Grey Wooded, often with a high organic peat content. As well, annual precipitation in some portions is slightly higher and the major factor limiting vegetation growth is the colder atmospheric temperature. Early successional upland vegetation includes woody species such as aspen and balsam poplar (*Populus tremuloides* and *balsamifera*) and birch (*Betula* species), this in time replaced by white spruce (*Picea glauca*) in climax forests. Subxeric, sandy sites occur, combining jack pine, aspen, and blueberry communities, and grass species such as short-awn rice grass, hairy wild rye (*Elymus innovatus*) and sheep fescue (*Festuca saximontana*).

Throughout the boreal forest, extensive and significant areas are covered by wetlands. At one end of the spectrum are true bogs, characterized by having little or no water movement, and acidic, nutrient-poor soils. Productivity and species richness on these sites is minimal, seen at the tree/shrub level and also with herbaceous graminoid and forb species. Typical components include Labrador tea (*Ledum groenlandicum*), peat (*Sphagnum* species), cloudberry (*Rubus chamaemorus*) and black spruce (*Picea mariana*). Also prevalent are fens and marshes which show improved soil nutrients, hence higher productivity and biodiversity. Shrub/tree cover is often increased, with the inclusion of tamarack (*Larix laricina*), and on superior sites, additions of or replacement of small bog willows (*Salix pedicellaris*) by larger species (*Salix lucida*, *planifolia*, *pyrifolia*). Prominence of sedges is frequently high, common species including (*Carex lasiocarpa*, *Carex aquatilis*, *Carex prairea*, *Carex diandra*, and with increased water movement, *Carex rostrata*.

5. The Montane Ecoregion

To the west of the foothills, but below subalpine elevations, lies the montane ecoregion, characterized by a pattern of forests, wetlands and grasslands. Included here are the familiar river valleys that follow the mountain passes, these more confined and narrow in the north, becoming rather extensive and significant southward. Precipitation in these regions is considerable, as is Chinook activity in southern areas that periodically allows for intermittently low snow cover. Soils are predominantly Brunisols, Grey Luvisols, Regosols, transitional to Chernozems in open grasslands and eastward into the foothills.

From a rangeland perspective, the montane region is at times underrated, lumped with the subalpine which often has lower growing, more sparse vegetation cover as a result of poorly developed, shallow soils and severe climatic limitations. By contrast, productivity and the consequent potential to support a wide diversity of life forms often equals that of the foothills region.

Driest sites occur on rocky, exposed slopes, and typical species include kinnikinnick (*Arctostaphylos uva-ursi*), hairy wild rye (*Elymus innovatus*), and tree cover is limited to a few limber pine (*Pinus flexilis*), with lodgepole pine (*Pinus contorta*), Douglas fir (*Pseudotsuga menziesii*) and Canadian buffalo-berry (*Shepherdia canadensis*) on somewhat better sites. Mesic grasslands are dominated by rough fescue (*Festuca campestris/altaica*) with Parry oat grass (*Danthonia parryi*) and bluebunch wheat grass (*Agropyron spicatum*) on drier upper slopes, and Richardson needle grass (*Stipa richardsonii*) along lower river terraces.

Forest cover on many upland sites is significant, due, at least in part, to lack of fire in recent years. Mixedwood communities are dominated by alder (*Alnus crispa*), willow (*Salix glauca, bebbiana, scouleriana*) and aspen (*Populus tremuloides*), successional to lodgepole pine and white spruce (*Picea glauca*). Understory species vary both with region and moisture regime, often including spiraea (*Spiraea betulifolia*), showy aster (*Aster conspicuus*), thimbleberry (*Rubus parviflorus*).

Wetlands are scattered throughout the region, typical species including birch (*Betula* species), willow (*Salix* species), horsetail (*Equisetum* species) and usually high cover of sedges (*Carex* species). Productivity on both the shrub and herbaceous layer is generally favorable, usually sustaining large populations of wild ungulates.

However important they may be to the well-being of the wildlife population and to the ecosystem as a whole, it is not the grasses or woody species that leave a lasting impression on the casual observer. It is, rather, the seemingly endless numbers of montane forbs, and the varied species compositions that change both with the seasons and from one ecosite to the next, and ultimately create a landscape unequalled elsewhere for its beauty.

> "The quawmash is now in blume and from the color of its bloom at a short distance it resembles lakes of fine, clear water, so complete in this deseption that on first sight I could have swoarn it was water."
>
> Meriwether Lewis, from *Original Journals of the Lewis and Clark Expidition*. June 12, 1806.

6. The Subalpine Ecoregion

Situated between the montane and true alpine regions is the subalpine ecoregion, generally defined as those areas with elevations between about 1,800 and 2,050 m. It is characterized by steep rolling landscapes, high precipitation (usually also with good snow cover in spite of Chinook activity in some locations), and like the montane ecoregion, contains many varied and often spectacular ecosites. The primary factor limiting vegetation growth is the severe and often harsh climate, and in some areas (as with the alpine region) poorly developed, shallow (Regosolic) soils, and often out-croppings of bedrock.

Also common in the region are subxeric sites, usually with some soil development (Brunisols) but coarse textures and steep slopes result in rapid internal and external drainage. Not unlike similar sites at lower elevations, there is usually a sparse conifer cover (lodgepole pine - *Pinus contorta*, Engelmann spruce - *Picea engelmannii*), and understory shrubs such as buffalo-berry (*Shepherdia canadensis*), kinnikinnick (*Arctostaphylos uva-ursi)* and juniper (*Juniperus* species). On the most exposed sites graminoid composition includes hairy wild rye (*Elymus innovatus*), June grass (*Koeleria macrantha*), sheep fescue (*Festuca saximontana*), bluebunch wheat grass (*Agropyron spicatum*), and in some areas a rather prominent cover of purple reed grass (*Calamagrostis purpurascens)*. Increased moisture (mesic sites) correlates to higher conifer cover (alpine fir - *Abies lasiocarpa*, lodgepole pine, Engelmann spruce), and understory/early phase shrub components vary from one location to the next, including such species as alder (*Alnus crispa*) rhododendron (*Rhododendron albiflorum)*, false azalea (*Menziesia ferruginea*) and tall bilberry (*Vaccinium membranaceum*). The typically sparse herbaceous understory includes, for example, hairy wild rye, pine grass (*Calamagrostis rubescens*), arnica (*Arnica cordifolia/ latifolia*) wintergreens (*Pyrola/Orthilia*), small ericaceous species.

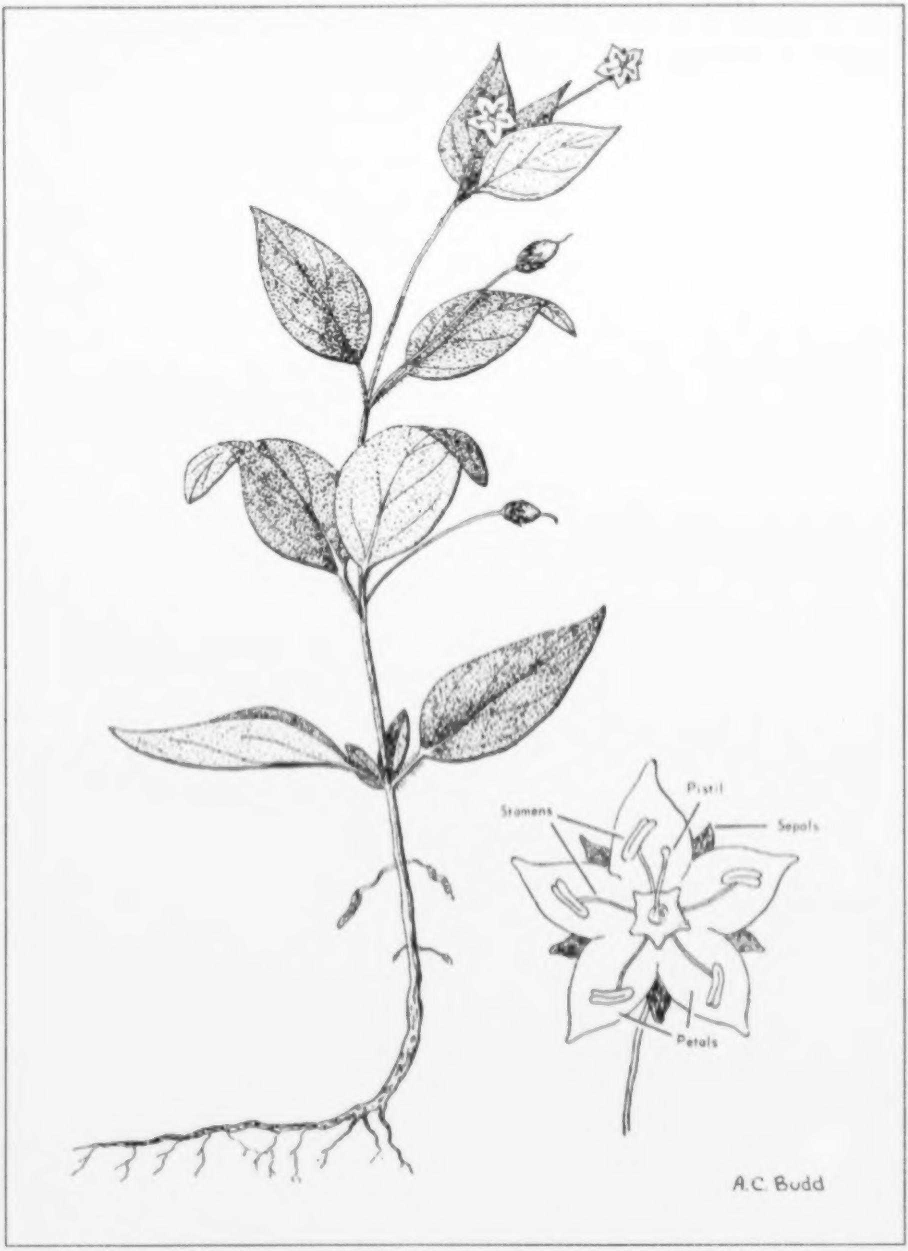
The subalpine region is not without rather extensive primary wildlife-use areas, productivity on many of these sites similar to that on equivalent montane sites. Chernozemic soils on submesic/mesic sites support rough fescue (*Festuca campestris/altaica*)-dominated grasslands, graduating to rough fescue/hairy wild rye communities and finally those with hairy wild rye as the climax species.

Subdominant graminoids vary as well, including kobresia (*Kobresia myosuroides*) big bluegrass (*Poa ampla*), Parry oat grass (*Danthonia parryi*), Richardson needle grass (*Stipa richardsonii*). Forb composition can be relatively simple on mesic grasslands, typically including such species as cinquefoils - *Potentilla* species, beard-tongues - *Penstemon confertus/procerus*, hedysarum - *Hedysarum sulphurescens*, alpine forget-me-not - *Myostis alpestris*.

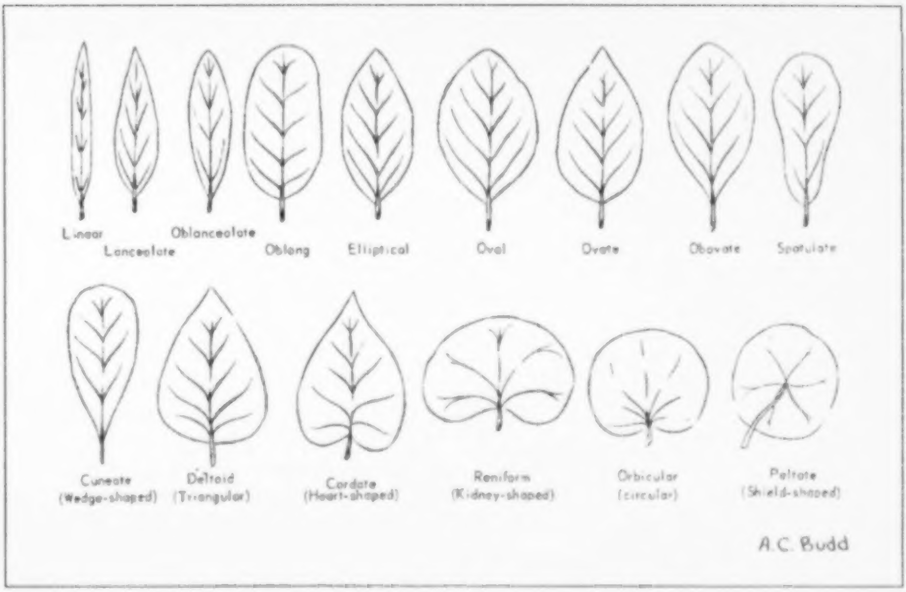
As is often the case, improved soil moisture implies greater vegetation diversity, and an increase in shrubby growth. Willow (i.e. *Salix farriae/glauca*) - birch (*Betula glandulosa/ pumila*) - sedge communities are common on the most productive sites, with lower slope black spruce (*Picea mariana*) sites graduating from Gleysolic to Organic soils, and with this an often rather sparse understory comprised of such species as coltsfoot (*Petasites palmatus*), Labrador tea (*Ledum groenlandicum*) and peat (*Sphagnum* species).

Typical of any ecoregion having a naturally high diversity of ecosites, the forb as well as small (often ericaceous) shrub component is inexhaustible, and thus the temptation to include these species in this text. However, to maintain a consistency with a rangeland theme, many of these, although highly visible and photogenic, are of rather minimal importance, also have already been the subject of numerous wild flower books. The list here, then, will be limited only to those most frequently occurring on "rangelands", also species that are especially common and likely to be encountered in grazing/wildlife studies. As well, a few have been discussed in an effort to introduce common but often difficult genera (ie. *Draba*). Admittedly, the ultimate decision as to which species to include may not always be entirely unbiased, subjectivity based at least somewhat on the author's specific field experiences.

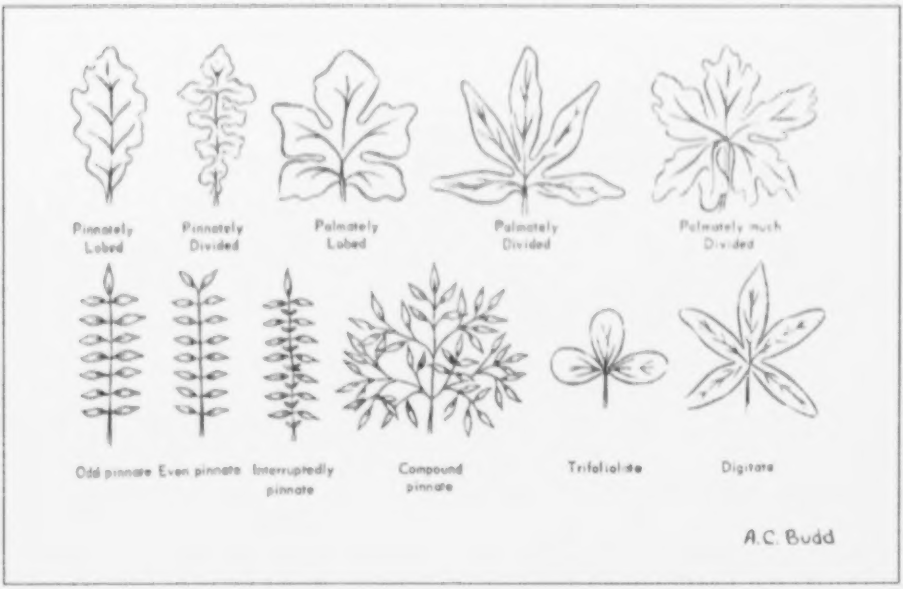
Illustrations of Forb Characteristics



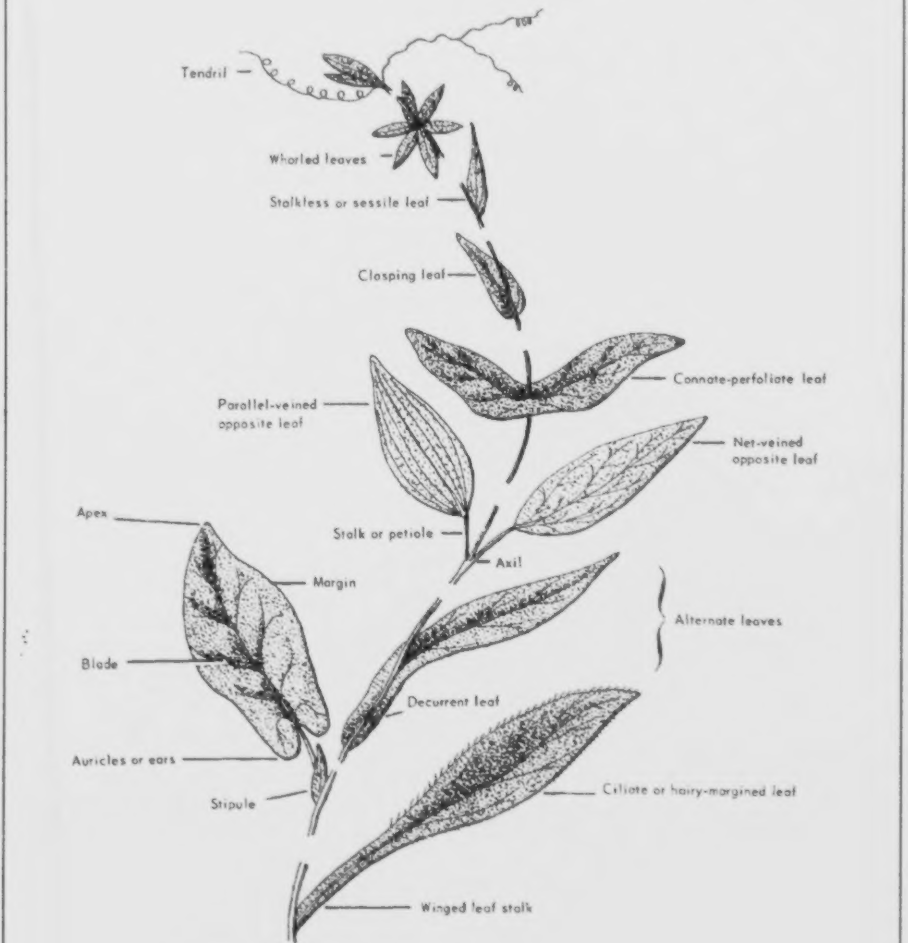
A specimen (*Lysimachia ciliata* L.) illustrating the use of the key.



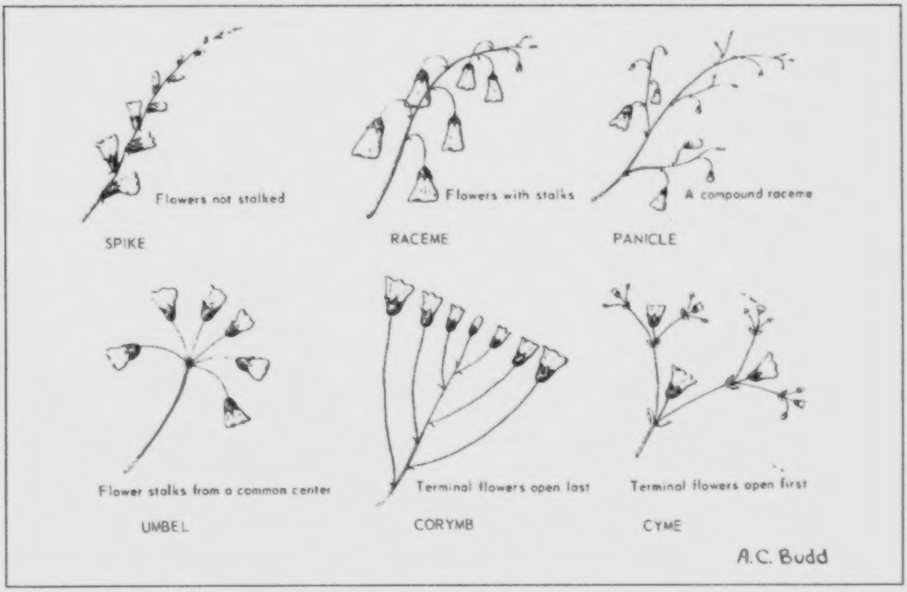
Shapes of simple leaves.



Types of divided leaves.



Leaf variations.



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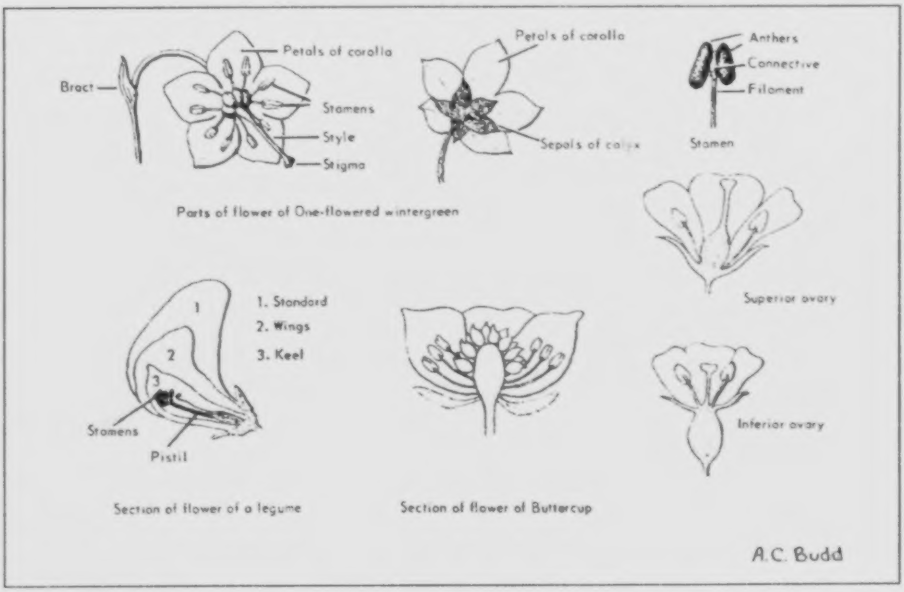
Types of inflorescences.



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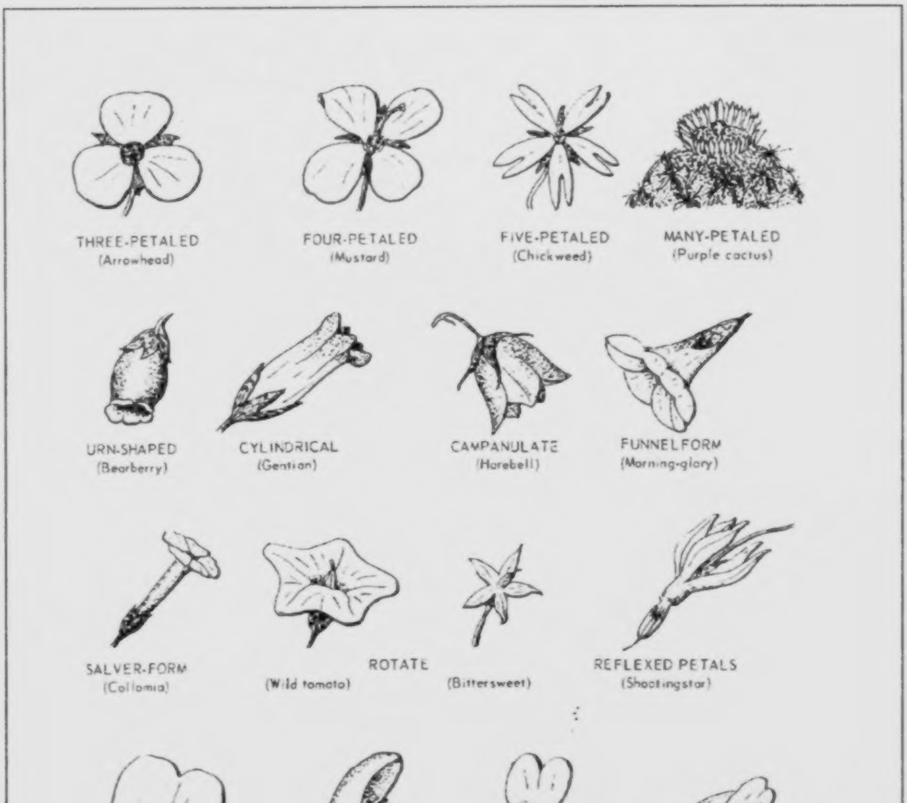
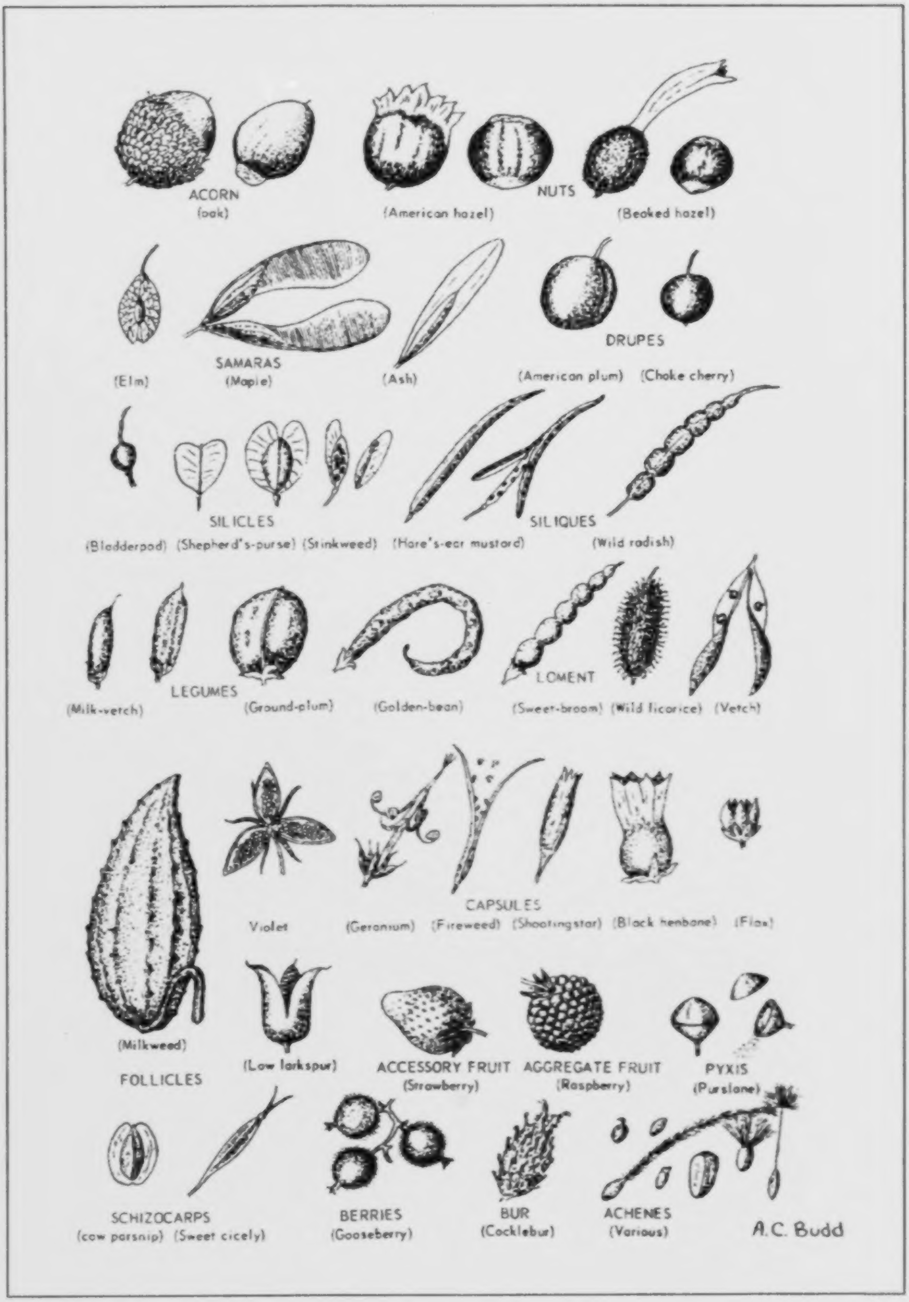
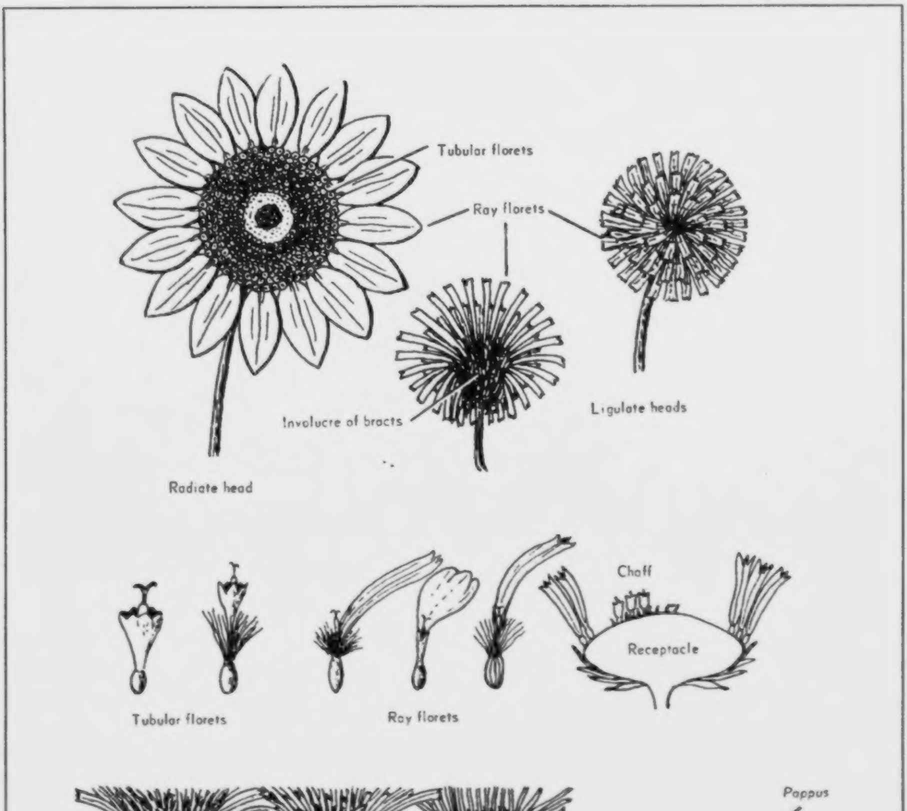
Flower parts.



Types of flowers.



Types of fruits.



Characteristics of composite flowers and fruit.

Forbs

Vascular Plant Key, to Family

1.	Herbs, reproduction by spores.	Division *Pteridophyta*
	Herbs or woody plants, reproduction by seeds.	Division *Spermatophyta* 2
2.	Ovules not contained within an ovary; seeds in a berry-like cone or more often in a dry cone; woody species; leaves usually evergreen, needle or scale-like.	Subdivision *Gymnospermae* Class *Coniferae* Vol. 2
	Ovules contained within an ovary, maturing into a fruit; herbs or woody plants; leaves usually deciduous.	Subdivision *Angiospermae* 3
3.	Leaves mostly parallel-veined; vascular bundles in stem irregularly arranged; cambium lacking; flower parts mostly in 3's or 6's; embryo with 1 cotyledon; mostly herbs.	Class *Monocotyledoneae*
	Leaves mostly net-veined; vascular bundles in stem usually in a single ring; cambium mostly present; flower parts mostly in 4's or 5's; embryo with 2 cotyledons; herbs or woody plants.	Class *Dicotyledoneae*

Division *PTERIDOPHYTA* - Ferns/Fern Allies

1.	Leaves mostly small, often scale-like, simple, sessile, to 2 mm. broad.	2
	Leaves larger, often over 5 cm. long, often toothed, more than 2 mm. broad.	4
2.	Stems hollow, jointed; leaves whorled at nodes, scale-like; sporangia arranged on scales, in terminal cones.	*Equisetaceae* p.27 Vol. 3
	Stems not hollow and jointed; leaves imbricate; sporangia either in cones, basal, or in sporophyll axils (these sometimes leaf-like).	3
3.	Heterosporous moss-like plants with leafy shoots to 6 mm. broad.	*Selaginellaceae* p. 26 Vol. 3
	Homosporous plants with leafy shoots more than 6 mm. broad.	*Lycopodiaceae* p. 24 Vol. 3
4.	Sporangia small, borne either on separate fronds or in clusters on back or near margins of green fronds; ferns.	*Polypodiaceae* p. 36 Vol. 3
	Sporangia large, in a terminal grape-like cluster, each with a sterile blade on the same stalk.	*Ophioglossaceae* p. 35 Vol. 3

Division *SPERMATOPHYTA*

Subdivision *Angiospermae* - Flowering Plants

Class *MONOCOTYLEDONEAE* - Monocotyledons

1.	Plants strictly aquatic under normal climatic conditions, most of vegetative and reproductive portions floating or submerged.	2
	Plants terrestrial or, if aquatic, rooted in the water and reproductive and much of vegetative parts erect/above water level.	3

2. Flowers in heads, these unisexual, globose. *Sparganiaceae* p. 45 Vol. 3

Flowers not in globose heads, perfect. *Potamogetonaceae* p. 46 Vol. 3

3. Plants of wet places, flowers in unisexual, globose heads. *Sparganiaceae* p. 45 Vol. 3

4. Perianth at least partially showy, colored and petal-like. 5

Showy, petal-like perianth lacking. 8

5. Leaf blades and stalks distinctly unalike; ovaries more than 1. *Alismataceae* p. 48 Vol. 3

Blades/stalks little differentiated; ovary 1. 6

6. Ovary superior, or partially inferior (and stamens 6). *Liliaceae* p. 51 Vol. 3

Ovary inferior, stamens 1-3. 7

7. Stamens 1-2, flowers irregular. *Orchidaceae* p.71 Vol. 3

Stamens 3, flowers regular. *Iridaceae* p.70 Vol. 3

8. Flowers in a fleshy spadix (spikes); floral bracts (spathe) large, showy. *Araceae* p.50 Vol.3

Spadix and spathe lacking. 9

9. Flowers brown, in dense cylindrical spikes; style and stigma 1; achenes stalked, hairy; large wetland species; cattails. *Typhaceae* p. 43 Vol. 3

Flowers not as above; styles and stigmas 3 or 6; fruit of follicles; smaller plants of calcareous or brackish, moist areas. *Juncaginaceae* p. 47 Vol. 3

Class *DICOTYLEDONEAE* - Dicotyledons

1. Perianth absent or of a single series of like appendages. Group I

Perianth of 2 distinctly different series of appendages, the inner usually colored. 2

2. Corolla petals separate. 3

Corolla petals united, or flowers irregular, sometimes with some united petals. 4

3. Stamens mostly numerous and more than twice as many as petals. Group II

Stamens twice as many as petals or fewer. Group III

4. Stamens more numerous than corolla lobes. Group IV

Stamens same in number as corolla lobes or less. Group V

GROUP I

1. Plants aquatic; leaves whorled, entire. *Hippuridaceae* p. 273 Vol. 3

Plants terrestrial. 2

2.	Ovary inferior, partly so, or appearing so.	3
	Ovary superior.	9
3.	Ovary or locules with numerous ovules.	*Saxifragaceae* p. 179 Vol. 3
	Ovary or locules with 1-2 ovules.	4
4.	Inflorescence head-like, subtended by separate bracts that form an involucre.	*Compositae* p. 374 Vol. 3
	Inflorescence not both head-like and with an involucre.	5
5.	Leaves basal or cauline and alternate.	7
	Leaves opposite to whorled.	6
6.	Leaves opposite.	*Nyctaginaceae* p. 114 Vol. 3
	Leaves whorled.	*Rubiaceae* p. 365 Vol. 3
7.	Flowers in umbels; leaves pinnate to much divided.	8
	Flowers not in umbels; leaves simple and entire.	*Santalaceae* p. 87 Vol. 3
8.	Styles 2.	*Umbelliferae* p. 275 Vol. 3
	Styles 5.	*Araliaceae* p. 274 Vol. 3
9.	Ovary or locules with many ovules.	10
	Ovary or locules with 1-2 ovules.	14
10.	Ovaries 2 or more, united at base or separate.	*Ranunculaceae* p. 127 Vol. 3
	Ovary solitary.	11
11.	Leaves divided.	*Ranunculaceae* p. 127 Vol. 3
	Leaves simple.	12
12.	Stamens 2.	*Scrophulariaceae* p. 336 Vol. 3
	Stamens more than 2.	13
13.	Sepals united at base to form a tube.	*Primulaceae* p. 294 Vol. 3
	Sepals not united.	*Caryophyllaceae* p. 115 Vol. 3
14.	Ovaries 2 or more.	*Ranunculaceae* p. 127 Vol. 3
	Ovaries solitary.	15
15.	Style and stigma 1.	16
	Styles (or branches) and stigmas 2-3.	17
16.	Leaves opposite; stinging hairs present; flowers imperfect.	*Urticaceae* p. 86 Vol. 3
	Leaves alternate; stinging hairs lacking; flowers perfect.	*Cruciferae* p. 157 Vol. 3
17.	Stamens 9, or, stipules (ocreae) sheathing stems at nodes.	*Polygonaceae* p. 90 Vol. 3
	Stamens not 9, stipules not sheathing as above.	18

18. Juice milky; ovary and fruit 3-loculed; flowers clustered resembling single flowers *Euphorbiaceae* p. 257 Vol. 3

Plants not as above. 19

19. Leaves alternate. 20

Leaves mostly opposite. *Caryophyllaceae* p. 115 Vol. 3

20. Flowers without scarious, subtending bracts; sepals fleshy or herbaceous, not scarious or spiny. *Chenopodiaceae* p. 101 Vol. 3

Flowers with scarious, spiny subtending bracts; sepals scarious. *Amaranthaceae* p. 112 Vol. 3

GROUP II

1. Plants aquatic, with large floating leaves; sepals 6, yellow, large and showy, petal-like. *Nymphaeaceae (Nuphar)* p. 50 Vol. 3

Plants not aquatic, sepals not 6, yellow. 2

2. Ovary inferior; rough-hairy plants. *Loasaceae* p. 265 Vol. 3

Ovary superior; plants not rough hairy. 3

3. Ovaries 2 or more, separated or only basally united. 4

Ovary solitary. 6

4. Stamen filaments united; ovaries in a coherent ring around a central axis. *Malvaceae* p. 258 Vol. 3

Stamen filaments not united; ovaries not as above. 5

5. Stipules mostly present; stamens inserted on disc (hypanthium). *Rosaceae* p. 187 Vol. 3

Stipules lacking; stamens inserted at base of ovaries on receptacle. *Ranunculaceae* p. 127 Vol. 3

6. Stamen filaments united; ovary several-loculed; flowers orange, regular; prairie species (this text). *Malvaceae* p. 258 Vol. 3

Stamen filaments not united; ovary 1-loculed. 7

7. Leaves trifoliate; fruit a pod-like capsule; sand species. *Capparidaceae* p. 155 Vol. 3

Leaves not trifoliate; fruit not pod-like; habitat variable. *Ranunculaceae* p. 127 Vol. 3

GROUP III

1. Flowers distinctly irregular. 2

Flowers regular or nearly so. 4

2. Stamens 10. *Leguminosae* p. 208 Vol. 3

Stamens less than 10. 3

3.	Petals and stamens each 5.	*Violaceae* p. 260 Vol. 3
	Petals 4; stamens 6, in 2 bundles.	*Fumariaceae* p. 153 Vol. 3
4.	Ovary inferior.	5
	Ovary superior.	9
5.	Stamens 4 or 8; flower parts in 4's.	6
	Stamens 5 or 10; flower parts in 5's.	7
6.	Leaves in whorls of 4-6 at stem tips; 4 petal-like, white bracts present below inflorescence; woodland species.	*Cornaceae* p. 288 Vol. 3
	Plants not as above.	*Onagraceae* p.266 Vol. 3
7.	Ovary 5-loculed; styles 5; fruit a black berry.	*Araliaceae* p. 274 Vol. 3
	Ovary 1 or 2-loculed; styles 2-3; fruit dry.	8
8.	Flowers in umbels.	*Umbelliferae* p. 275 Vol. 3
	Flowers in racemes or cymes.	*Saxifragaceae* p. 179 Vol. 3
9.	Ovary solitary.	10
	Ovaries 2 or more, united basally or separate.	21
10.	Small insectivorous bog plants; leaves with gland-tipped hairs.	*Droceraceae* p. 176 Vol. 3
	Plants not as above.	11
11.	Ovary 1-loculed.	12
	Ovary more than 1-loculed.	16
12.	Style 1.	13
	Styles more than 1.	14
13.	Stamens 5; leaves pinnate.	*Leguminosae* p. 208 Vol. 3
	Stamens more than 5; leaves 3-foliate; sand species.	*Capparidaceae* p. 155 Vol. 3
14.	Branched gland-tipped staminodes present, 5, alternate stamens.	*Parnassiaceae* p. 186 Vol. 3
	Gland-tipped staminodes absent.	15
15.	Leaves opposite, styles 2-5.	*Caryophyllaceae* p. 115 Vol. 3
	Leaves alternate or basal; styles 2.	*Saxifragaceae* p. 179 Vol. 3
16.	Styles 5; flowers blue or yellow; leaves narrow, numerous, entire.	*Linaceae* p. 255 Vol. 3
	Styles 1-3.	17
17.	Plants woody below; leaves 3-foliate; fruit a berry.	*Anacardiaceae* p. 98 Vol. 2
	Plants herbaceous; leaves not 3-foliate; fruit dry.	18

18. Stamens 6. *Cruciferae* p. 157 Vol. 3

Stamens 10 (8). 19

19. Leaves conspicuously palmately divided. *Geraniaceae* p.252 Vol. 3

Leaves entire to shallowly toothed. 20

20. Styles 1; woodland plants with firm, simple stalked leaves. *Pyrolaceae* p. 289 Vol. 3

Styles 2; habitat and leaves variable. *Saxifragaceae* p. 179 Vol. 3

21. Ovaries separate; ovaries with 1 ovule each. 23

Ovaries united basally; ovaries with several ovules each. 22

22. Leaves not fleshy; ovaries 2. *Saxifragaceae* p. 179 Vol. 3

Leaves fleshy; ovaries 5. *Crassulaceae* p. 177 Vol. 3

23. Stamens inserted on a disc; stipules evident. *Rosaceae* p. 187 Vol. 3

Stamens inserted on the receptacle; stipules lacking. *Ranunculaceae* p. 127 Vol. 3

GROUP IV

1. Stamens 10; flowers not spurred. *Leguminosae* p. 208 Vol. 3

Stamens less than 10; flowers spurred. 2

2. Leaves entire; flowers yellow or orange; of moist places, boreal forest. *Balsaminaceae* p. 154 Vol. 3

Leaves finely divided; flowers yellow or pink. *Fumariaceae* p. 153 Vol. 3

GROUP V

1. Parasitic plants, pink-brownish; leaves reduced to papery scales. *Orobanchaceae* p. 357 Vol. 3

Plants not parasitic, green; leaves well developed. 2

2. Stamens equal in number to corolla lobes, opposite them. *Primulaceae* p. 294 Vol. 3

Stamens equal in number or fewer than corolla lobes, alternate them. 3

3. Ovary superior. 4

Ovary inferior. 20

4. Corolla irregular. 5

Corolla regular. 7

5. Stems square; leaves opposite; ovary 4-lobed. *Labiatae* p. 329 Vol. 3

Plants without above combination of characteristics. 6

6. Ovary 2-loculed. *Scrophulariaceae* p. 336 Vol. 3

Ovary 1-loculed; aquatic or scapose plants of moist places. *Lentibulariaceae* p. 359 Vol. 3

7.	Stamens 2.	8
	Stamens 4 or 5.	10
8.	Stems square; ovary 4-lobed.	*Labiatae* p. 329 Vol.3
	Plants not as above.	9
9.	Leaves basal; corolla small, scarious.	*Plantaginaceae* p. 362 Vol. 3
	Leaves opposite; corolla herbaceous.	*Scrophulariaceae* p. 336 Vol. 3
10.	Stamens 4.	11
	Stamens 5.	13
11.	Leaves opposite.	*Labiatae* p. 329 Vol. 3
	Leaves basal.	12
12.	Flowers solitary.	*Scrophulariaceae* p. 336 Vol. 3
	Flowers numerous, in elongated spikes.	*Plantaginaceae* p.362 Vol. 3
13.	Leaves trifoliate; corolla lobes fringed; wetland species.	*Menyanthaceae* p. 307 Vol. 3
	Leaves not trifoliate; corolla lobes not fringed.	14
14.	Juice milky; ovaries (2) separate except sometimes at apex.	15
	Juice not milky; ovary not as above.	16
15.	Stamens united into a tube.	*Asclepiadaceae* p. 310 Vol. 3
	Stamens not united	*Apocynaceae* p. 308 Vol. 3
16.	Ovary deeply 4-lobed.	*Boraginaceae* p. 317 Vol. 3
	Ovary not deeply 4-lobed.	17
17.	Ovary 1-loculed.	18
	Ovary 2 or more-loculed.	19
18.	Leaves alternate or basal, usually divided.	*Hydrophyllaceae* p. 315 Vol. 3
	Leaves opposite, not toothed.	*Gentianaceae* p. 303 Vol. 3
19.	Ovary 3-loculed; stigma 3-divided.	*Polemoniaceae* p. 311 Vol. 3
	Ovary 2-loculed; stigma undivided or 2-divided.	*Scrophulariaceae* p. 336 Vol. 3
20.	Flowers in heads subtended by an involucre (bracts).	21
	Flowers not as above.	23
21.	Stamens 5, their anthers in a united tube around the style.	*Compositae* p. 374 Vol. 3
	Stamens 4, their anthers not united.	22
22.	Cauline leaves entire, in whorls.	*Rubiaceae* p. 365 Vol. 3
	Cauline leaves pinnate, opposite.	*Dipsacaceae* p.371 Vol. 3

23. Juice milky, leaves alternate;
flowers blue to purplish. *Campanulaceae* p. 373 Vol. 3

Leaves whorled or opposite;
flowers not blue to purplish. **24**

24. Leaves opposite, pinnately divided;
northern/western species. *Valarianaceae* p. 369 Vol. 3

Leaves whorled, entire; widespread. *Rubiaceae* p. 365 Vol. 3

LYCOPODIACEAE - Club-moss Family
LYCOPODIUM L. - Club-moss

Common Characteristics

- Plants evergreen, low growing.
- Stems trailing, creeping, rooting.
- Branches simple or several to many-forked.
- Leaves short, stiff, linear-lanceolate, 1-nerved, overlapping.
- Plants without flowers and seeds, reproduction by spores.
- Spores arranged in sporangia (spore-cases) and in axils of leaves, these often organized in strobili (club-like spikes).
- Gametophyte usually subterranean, mycorrhizal, sometimes terrestrial, green, thalloid.

Key to Lycopodium

1. Cones borne on long stalks. 2

Cones mostly sessile. 3

2. Leaves in 4 rows, scale-like ventral ones shorter; leaves sharp-pointed; cones 1-3. *L. complanatum*

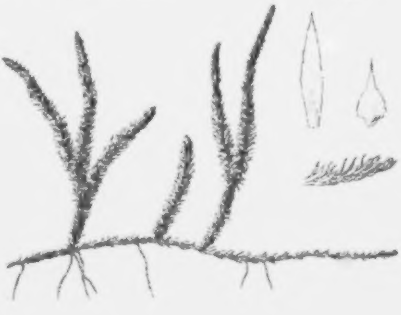
Leaves in 8-10 rows, with pointed hair-like tips; cones 1-6. *L. clavatum*

3. Stems subterranean; ascending branches much forked, giving a tree-like appearance; boreal species. *L. obscurum*

Stems trailing above ground; ascending branches few forked; leaves firm, linear, sharp-pointed; widespread. *L. annotinum*

Lycopodium annotinum L. - Stiff Club-moss

Growth Habit: Plants with **prostrate stems, these mostly aerial and rooting**; branches erect, 1-3 dm. tall, arising at intervals, erect to lax, simple or few-branched.

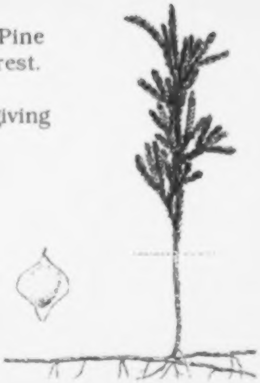


Blades: **Linear, 3-10 mm. long, spreading to reflexed, firm and sharp pointed**, giving plants a prickly appearance, **in 8 rows** with 2 subwhorls of 4 each.

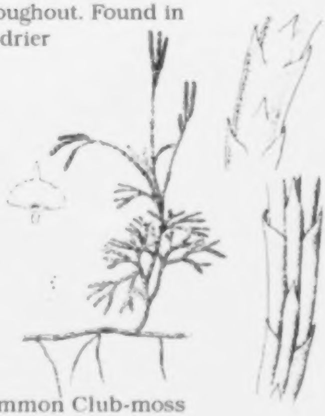
Strobili: **Sessile**, 1.5-3.5 mm. long, borne at apex of branches; sporophylls **differing from leaves**, margins thin and erose-lacerate; gametophyte subterranean.

Similar Species:

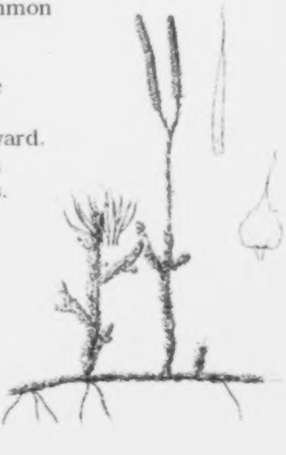
1. ***Lycopodium obscurum*** L. - Ground Pine
   Found in moist open woods. Boreal forest.
   Differs as follows:
   - Aerial branches much-branched, giving plants a tree-like appearance.
   - Horizontal stems subterranean.



2. ***Lycopodium complanatum*** L. - Ground Cedar
   Common in wooded regions throughout. Found in moist coniferous woods, also in drier pine forests.
   Differs as follows:
   - Aerial shoots much-branched, flattened, the dorsal side convex, the ventral concave.
   - Leaves scale-like, sharp-pointed, of two types: 3 dorsal and lateral longer, their tips surpassing the base of the next; ventral ones short, remote.
   - Cones borne on stalks.



3. ***Lycopodium clavatum*** L. - Common Club-moss
   Scattered in foothills, montane and boreal regions, absent from the south. Common in dry woods.
   Differs as follows:
   - Prostrate plants, creeping above ground and rooting.
   - Branches somewhat forked upward.
   - Leaves in 10 ranks, linear, often incurved, with soft hair-like tips.
   - Cones 1-6, on stalks 3-12 cm. long.



Habitat & Distribution:

Common in wooded areas. Grows in moist woods, especially in coniferous forests, sometimes in boggy areas in woods, in clearings.

Forage Value: Poor, rarely used, also typically is found in densely forested areas where grazing is normally light; *Lycopodium* species contain alkaloides, but with the exception of perhaps *L. selago*, have not been linked to fatalities.

Grazing Response: Increasers in wooded regions but not invasive.

Notes: From the Greek *lycos*, wolf, and *pous*, foot, apparently referring to the branched shoots of some species; members of the club-moss family were used in traditional medicines in a number of ways, applied externally to treat skin conditions and wounds, and despite the potential for alkaloid poisoning, *L. clavatum* tea was taken for internal pain, diseases and for fever, also used by natives as a mordant to set dyes; more recently, a species in China has been studied for its potential to help Alzheimer's patients, other species commonly a part of homeopathic medicine; from an environmental perspective, the trailing woodland plants make excellent ground cover, although attempts to transplant them are often of limited success.

SELAGINELLACEAE - Selaginella Family
SELAGINELLA L. - Little Club-moss

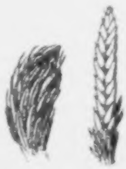
Common Characteristics

- Small evergreen herbs, moss-like, mat forming.
- Roots fibrous, arising from small organs (rhizophores) at stem bases.
- Leaves 1-nerved, very small, 4-ranked to spiral, overlapping.
- Leaves containing spore sacs in terminal spikes (cones).
- Plants with 2 kinds of spores, the larger spores (megaspores) in the lower part of the cones, the small spores (microspores) in the upper portion.

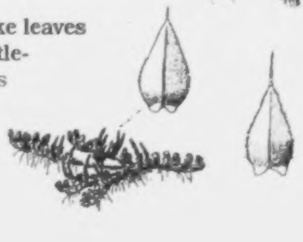
Selaginella densa Rydb. - Prairie Selaginella

Growth Habit: **Mat-forming, cushion-like plants**, forming tufts up to 1 dm. wide, sterile branches ascending, **often curved at tip**.

Blades: **0.5 mm. wide, to 3 mm. long**, linear, firm, **spirally arranged, terminated by whitish bristles**, these **forming fringed tufts at ends of branches**, the bristles slightly broader at the base, 0.5-2 mm. long; leaves on lower (convex) side of branches slightly longer than the rest.



Cones: Leaves containing spore sacs **much like leaves except keeled, in 4 definite rows, bristle-tipped**; spores orange, the megaspores about 0.4 mm. in diameter.



Habitat & Distribution: Frequent in all ecoregions except the boreal forest. Found in open, dry sites: on exposed rocky places, sandy soil, especially common in open dry prairie grassland. Tolerant of poor soils and droughty conditions.

Forage Value: Poor, providing little or no forage.

Grazing Response: An increaser, and in some areas claims are made that associated range species show reduced vigor and cover values.

Notes: The generic name is diminutive of *Selago*, an ancient name for some species of *Lycopodium*; also called little club-moss; prairie selaginella has natural abortive properties and apparently was used by some native tribes to induce labor and expel afterbirth; selaginella functions to some extent in providing ground cover and controlling wind and water erosion, contributing to water holding capacity of the soil and overall site stability; its absence on sites where it is normally expected can indicate a prior disturbance (fire, cultivation) that might not otherwise be detected from observations of associated plant species.

EQUISETACEAE - Horsetail Family
EQUISETUM L. - Horsetail; Scouring Rush

Common Characteristics

- Plants creeping, often forming tubers; roots branching in whorls from nodes, jointed.
- Aerial portions jointed, rush-like.
- Stems either simple, or with branches in whorls at nodes.
- Leaves small, scale-like, whorled, attached to sheaths with only the tips free, these sometimes early deciduous.
- Cones terminal.
- Spores very small, green.

Key To Equisetum

1.	Sheaths reddish-brown and coherent into 3-4 united lobes above; branches often again branched, downward curved.	*E. sylvaticum*
	Sheaths and branches without above characteristics.	2
2.	Stems both green and (usually) unbranched; cones pointed (not always in *E. laevigatum*, not in *E. fluviatile*).	3
	Stems either green and branched, or yellow-brown to grey-green; cones not pointed.	7
3.	Stems 1-3 dm. tall, less than 3 mm. wide, with 3-12 ridges; sheaths mostly less than 4 mm. long.	4
	Stems 2-10 dm. tall, more than 3 mm. wide, with 10-40 ridges; sheaths mostly more than 4 mm. long.	5

4. Stems 1-3 mm. wide, without sharp angular bends; sheath teeth more than 3. *E. variegatum*

Stems wiry, zig-zag bent, 0.5-1 mm. wide; sheath teeth 3. *E. scirpoides*

5. Sheath teeth with very narrow hyaline margins; stems shiny, papery, easily crushed; cones not pointed; often semi-aquatic. *E. fluviatile*

Teeth either missing from sheaths, or, if present, with broad hyaline margins; stems firm, not shiny; cones often pointed. 6

6. Sheaths with 2 black bands, their teeth broadly hyaline-margined; stems firm; cones pointed. *E. hyemale*

Sheaths usually with only one black band; teeth deciduous except below cones; cones rounded to slightly pointed. *E. laevigatum*

7. Lowest internode of branches longer than corresponding stem sheaths. *E. arvense*

Lowest internode of branches shorter than corresponding stem sheaths. 8

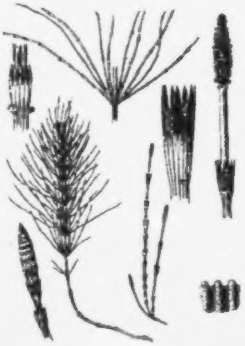
8. Stems roughened above from small tubercles; branch sheaths 3-toothed and angled; common in moist woods. *E. pratense*

Stems smooth above; branch sheaths 4-6-toothed and angled; sometimes semi-aquatic. 9

9. Stem sheaths with 10-30 teeth. *E. fluviatile*

Stem sheaths with 6-8 teeth. *E. palustre*

Equisetum arvense L. - Common or Field Horsetail



Growth Habit: Roots **extensively branched and creeping**, tuberous, covered with dark felt.

Aerial Shoots: Annual, jointed, **of two types: fertile 1-3 dm. tall, pale to pinkish-brown, unbranched, appearing early in spring and soon withering; sterile shoots 1-5 dm. tall, green, with 10-12 ridges, appearing later in the season.**

Branches: Branches **in regular whorls**, ascending to somewhat spreading, 3-4 angled, solid, occasionally again branched; **lowest internode of each branch distinctly longer than corresponding stem sheath.**

Sheaths: Sheaths of fertile stem **larger, dark, 14-20 mm. long**, with teeth 5-9 mm. long; sheaths of sterile stems **5-10 mm. long**, the teeth 1-3 mm. long, 10-12 in number and often coherent (joined); brownish with **wide dark brown midvein, margins not pale, upper sheaths lacking secondary bud-like growths**.

Cones: Long-stalked, blunt, 0.5-3.5 cm. long, producing very small green spores.

Habitat & Distribution: Very common throughout all ecoregions. Found in a variety of habitats: on roadsides, gravelly banks, sandy places, in moist woods, depressional areas, ditches, cultivated fields, and in waste and disturbed areas. In western regions, an indicator of hygric, rich fluvial/morainal sites successional to white spruce.

Forage Value: Poor; although at one time considered useful summer forage for horses by the Blackfoot people, horsetails as a whole are regarded as unimportant range species, and *E. arvense* is known to be somewhat poisonous to horses when fed in hay.

Grazing Response: An increaser, especially common on exposed sandy and gravelly soil, but seldom troublesome in grassland.

Notes: A very common species, with a world-wide distribution; the name from the Latin *equus*, horse, and *seta*, translating bristle, to which the branching stems of some species bear resemblance; also known as goosegrass; horsetails were variously used by native people, both as a food source and also for a number of medical conditions: teas were a well-known diuretic, also used for dropsy and for a number of female problems; the high silica content had medicinal value in treating skin disorders, also made the plants useful to smooth and polish wooden surfaces; *E. arvense*, often very abundant, provides cover on poor, coarse soils where vegetation cover is often naturally sparse.

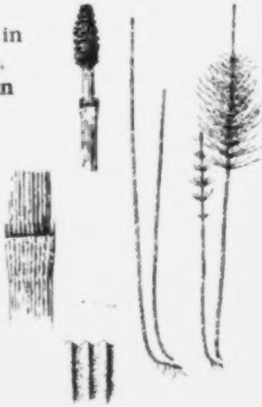
Equisetum fluviatile L. - Swamp Horsetail

Growth Habit: From long-creeping roots, these **glossy, reddish**, not felted.

Aerial Shoots: **Fertile and sterile alike**, 5-10 dm. tall, annual, **conspicuously shiny, smooth, soft**, with 10-30 grooves, the **central cavity relatively large, 4/5 the stem diameter**.

Branches: Either **absent, few** and irregular, **or many** in consistent whorls, but without branchlets, 4-6 angled, the **first internode shorter than the associated stem sheath**.

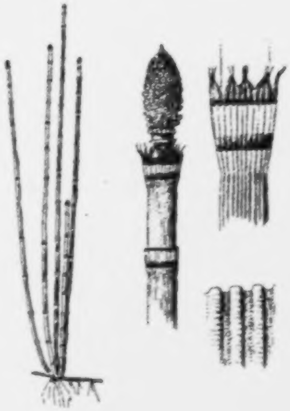
Sheaths: Stem sheaths **10-30**, greenish, 5-10 mm. long, the **teeth brown to blackish, margins not hyaline**, 1-3 mm. long, **persistent**, often partly connate.



Cones:	On short peduncles, terminating main stems, blunt, deciduous.
Habitat & Distribution:	Common except in driest regions. Found in wet places: marshes, on river shores, swampy areas, sometimes in shallow water.
Forage Value:	Poor, toxicity of *E. fluviatile* specifically is undocumented, but it is probable that livestock can be affected when large quantities are ingested; as with other species, the foliage is seldom grazed, *E. fluviatile* in particular, often inaccessible due to habitat.
Grazing Response:	An increaser.
Notes:	*Fluviatile* appropriately translates river; human utilization of the genus as a whole was once common although sometimes questionable: foliage is considered safe to consume only when boiled at least 20 minutes and the water changed; the high silica content of horsetails made them useful in treating eye and skin diseases, and as they encourage coagulation, were used to treat various blood disorders; *E. fluviatile*, specifically, has exceptional value in stabilizing wet soil along rivers and streams and is adapted to periodic inundation.

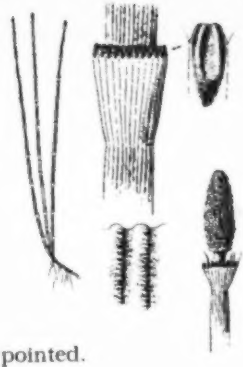
Equisetum hyemale L. var. ***affine*** (Engelm.) A.A. Eat. - Common Scouring Rush

Growth Habit:	Plants with black creeping roots, these felted.
Aerial Shoots:	**Sterile and fertile alike, evergreen, usually unbranched, rough**, 2-12 dm. tall, with 14-40 ridges, these with 2 rows of tubercles, or the tubercles cross-joined into a series of transverse bars; central cavity at least 3/4 the stem width; **stems stiff and firm**.
Branches:	Absent.
Sheaths:	Green to grey-green, 5-15 mm. long, **black banded both at the base and at the tip**, the lowest sometimes almost entirely black; teeth dark, with hyaline margins, 2-4 mm. long, **deciduous or occasionally a few persistent**.
Strobili:	Short-peduncled, 1-2.5 cm. long, **distinctly pointed**.



Similar Species:

1. ***Equisetum laevigatum*** A. Br. - Smooth Scouring Rush
   Found in similar habitats as *E. hyemale* but restricted to southern regions.
   Differs as follows:
   - Stems mostly smooth, soft.
   - Sheaths without basal black band, but with a single terminal band.
   - Teeth promptly and early deciduous, except sometimes those subtending cones.
   - Cones rounded at the apex, rarely pointed.



Habitat & Distribution: Common throughout most ecoregions. Often associated with coarse fluvial soils, found on stream banks, on sandy shores, in moist woods, in sandy areas with a high water table.

Forage Value: Poor, linked to adverse symptoms in livestock, thus regarded with suspicion; a number of poisonous components have been identified, their primary effect the destruction of thiamine.

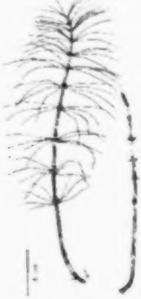
Grazing Response: Increasers (both species).

Notes: Traditional human uses were similar to those of other species, but *E. hyemale* was specifically used as a diuretic, mixtures applied to heal wounds and thought to be effective in treating a number of female problems; actual benefits of internal use are questionable because of the potential for poisoning; *E. hyemale* has an especially high silica content, so high in fact, that claims are made that it can polish metal; it is still valued in polishing fine wood products, sometimes used in violin making; unbranched *Equisetum* species are transplanted as ornamentals, also in efforts to stabilize loose sandy and gravelly soil.

Equisetum pratense Ehrh. - Meadow Horsetail

Growth Habit: From black creeping roots.

Aerial Shoots: Shoots annual, **fertile and sterile distinctly different**; fertile stems appearing earlier in spring, **pale and unbranched at first, becoming branched and green, persistent**; sterile shoots more common, often solitary, pale green, 2-5 dm. tall, **with 10-18 ridges**; these with protruding ridges or tubercles, **making stems rough to touch**, at least above; central cavity 1/3- 1/2 the stem diameter.



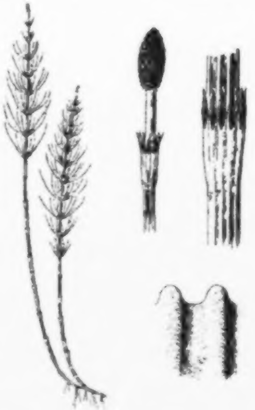
Branches: Those of sterile stems **in regular whorls**, green, slender, **3-angled**, not again branched; **lowest internode of each branch mostly shorter than corresponding stem sheath**.

Sheaths: Those of sterile stems 2-6 mm. long, green, the teeth **dark-based and with dark midribs**, margins **broadly hyaline**; 1-2 mm. long; sheaths and teeth of fertile stems somewhat longer.

Strobili: Cones stalked, blunt, deciduous.

Similar Species:

1. ***Equisetum palustre*** L. - Marsh Horsetail
   Also common, found in moist to wet places; on stream banks, in moist woods, marshes and fens, sometimes in shallow water.
   Differs as follows:
   - Fertile and sterile shoots alike.
   - Shoots soft and smooth, the central cavity less than 1/3 the stem diameter.
   - Stem ridges 5-10.
   - Branches often numerous and whorled, 5-6 angled.
   - Sheath teeth brown-black with hyaline margins.



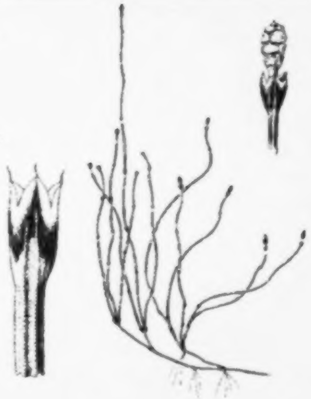
Habitat & Distribution: Common throughout most regions. Found in moist places: on stream banks, in wet sandy places, in moist woods. An indicator of hygric woodland ecosites that are typically nutrient-rich. Forms a climax understory in fluvial white spruce forests.

Forage Value: Poor; although not consumed in quantities under normal conditions, *E. palustre*, specifically, is known to be toxic to livestock, both fresh and when fed in hay; it is probable that mild cases of poisoning will respond to the administration of B vitamins, which supposedly will reverse the negative effects.

Grazing Response: Increasers.

Notes: The name *pratense* means meadow, *palustre* translates marsh or pool; as with other species, medicinal uses by aboriginal people were varied and numerous, listed as diuretic, to treat bleeding disorders and various skin problems, to soothe sore feet and for excessive perspiration; both *E. palustre* and *E. pratense* are often abundant, and, as such, can provide significant ground cover, the former more tolerant of saturated soils, the latter typically found in moist wooded areas.

Equisetum scirpoides Michx. - Dwarf Scouring Rush



Growth Habit: Rootstocks widely branched, slender, averaging 1-1.5 mm. thick.

Aerial Shoots: **Stems all alike, evergreen, 6-16 cm. long**, prostrate to ascending, densely clustered, often arched-recurved, **often zig-zag; stems very slender, 0.5-1 mm. thick**, 6-grooved and angled, without a central cavity, with 3 vallecular cavities; ridges each with one row of tubercles, stomates in 2 rows in each main furrow, sunken.

Branches: Absent.

Sheaths: Sheaths short (3-4 mm. long), loose, the **teeth 3-4**, green basally, often white-hyaline at apex, with a dark median band that prolongs as a short, soft bristle.

Strobili: **Cones small, 3-5 mm. long**, subsessile to short-stalked, pointed.

Similar Species:

1. ***Equisetum variegatum*** Schleich. - Variegated Horsetail :
   A species with a similar distribution, although less common in northern regions, and absent from Cypress Hills. Grows in wet bogs and thickets, on sandy shores.
   Differs as follows:
   - Stems thicker (1-2 (3) mm. wide) and longer, 1-4 dm.
   - Stems straight to curved, not bent-zig-zag.
   - Central cavities in stems present.
   - Furrows with 2 rows of stomates each.
   - Sheath teeth (and ridges) 5-12.
   - Cones 5-8 mm. long.

Habitat & Distribution: Common in most regions, absent from the prairies. Grows in damp woods and thickets, in springy, mossy places.

Forage Value: Poor, relative toxicity comparable to other *Equisetum* species, but generally consumed in insufficient quantities to cause symptoms.

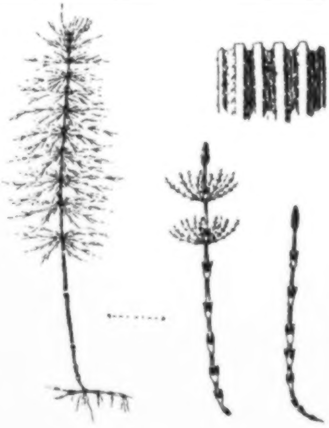
Grazing Response: Increasers.

Notes: The specific *scirpoides* means bulrush, to which it bears a superficial resemblance; in spite of their inconspicuous nature, both *E. scirpoides* and *E. variegatum* are surprisingly attractive and have been successfully planted in moist, shaded places where their evergreen foliage provides year-round ground cover.

Equisetum sylvaticum L. - Woodland Horsetail

Growth Habit: Plants with deep, extensive creeping roots.

Aerial Shoots: Fertile and sterile shoots annual, **different**; fertile stems pinkish-brown to green, unbranched at first, later producing whorls of branches; sterile stems 3-7 dm. tall, 10-18 ridged, with a vertical row of spinules on each margin of the ridges.



Branches: **Numerous, simple, or often again branched**, 4-5 angled, slender and **usually curved downward**; first internode shorter than associated internode on main stem.

Sheaths: Sheaths of sterile stems 4-12 mm. long, pale to green below, teeth 2-7 mm. long, **red-brown**, persistent, **coherent into 3-4 united lobes**; sheaths and teeth of fertile stems similar but somewhat larger.

Strobili: Cones long-stalked, blunt, deciduous.

Habitat & Distribution: Common in the boreal forest, central foothills, sporadic southward. Found in moist places: moist, often boggy woods, on stream banks, in wet meadows, and springy, wooded places. Associates with oak fern, devil's-club, also poorly drained black spruce sites in the boreal forest and foothills.

Forage Value: Poor, as with several other species, *E. sylvaticum* has not been specifically identified as poisonous, but it has been assumed that toxicity is similar to that of *E. palustre* and *E. arvense*.

Grazing Response: Increasers.

Notes: *Sylvaticum*, from the Latin *sylva*, forest, both this and the common name appropriately describing the species' preferred habitat; woodland horsetail is one of our more attractive species, and as it often associates with native ferns, can be planted in combination with them in cool, moist gardens.

OPHIOGLOSSACEAE - Adder's Tongue Family
BOTRYCHIUM Sw. - Grape Fern

Common Characteristics

- Plants from erect rootstocks and clusters of fleshy roots.
- Fronds of one sterile and one fertile blade, these arising from the rootstock.
- Base of stipe with an evident bud for the next year's frond.
- Sterile frond sessile or stalked, often dissected/compound.
- Fertile blade with grape-like clusters of large spherical sporangia.
- Annulus lacking, sporangia opening by 2 valves.
- Spores numerous, yellow.
- Gametophytes usually subterranean.

Key To Botrychium

1. Small plants 2-25 cm. tall; sterile blade not stalked, lanceolate, longer than broad, firm, with fan-shaped segments, inserted at middle of stipe. *B. lunaria*

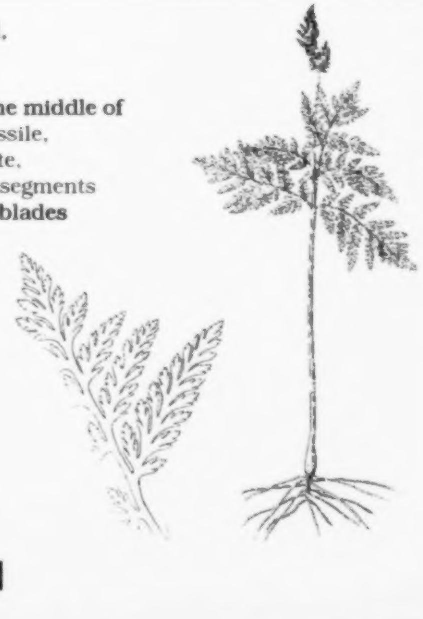
Plants taller, 20-50 cm. high; sterile blade sessile, large (more than 6 cm. long), broader than long (10 cm.+ wide), delicate. *B. virginianum*

Botrychium virginianum (L.) Sw. - Grape Fern

Growth Habit: Plants erect, **20-50 cm. tall, the basal bud hairy**.

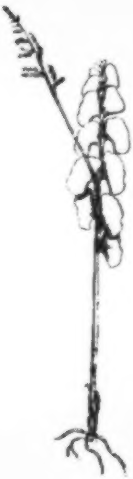
Fronds: **Fronds inserted at about the middle of stipes**, the sterile nearly sessile, **triangular in outline**, ternate, decompound, the ultimate segments incised, oblong-lanceolate; **blades delicate, usually more than 6 cm. long and 10 cm. wide**.

Sori: Fertile fronds bi-tripinnate, on stalks 5-20 cm. long.



Similar Species:

1. **Botrychium lunaria** (L.) Sw. - Moonwort
   One of several smaller representatives of the family, found in western regions and at high altitudes in the boreal forest. Also in Cypress Hills.
   Distinguished as follows:
   - Plants 2-25 cm. tall; base of stipes not swollen.
   - Sterile blades inserted at about the middle of plant, once pinnate.
   - Pinnae 3-7 pairs, broadly fan-shaped to semicircular, often overlapping.
   - Fertile blade extended above the sterile.



Habitat & Distribution: Found in moist woods, restricted to the boreal forest, foothills and montane regions.

Forage Value: Poor.

Grazing Response: Increasers, or increaser #1 for smaller less competitive (and in some cases rare) species, none considered aggressive in any way.

Notes: From the Greek *botrys*, a bunch of grapes, this as well as the common name referring to the sporangia panicles; grape ferns are uniquely attractive, but most species are not recommended for introduction into cultivated environments as they typically have poor survival rates, this due, in part, to their rather specific habitat requirements; where rare species occur, mechanical disturbance of the sites should be avoided if possible.

POLYPODIACEAE - Fern Family

Common Characteristics

- Underground stems either horizontal and creeping or short and erect, sometimes plants arising from a branched caudex.
- Rhizomes commonly with scales or hairs.
- Leaves (fronds) circinately coiled (fiddlehead shape) before expansion.
- Fronds with simple to compound/decompound blades, these on rather short stipes.
- Fertile fronds similar to or distinctly different from the sterile.
- Sporangia aggregated into brownish clusters (sori) on the margins or backs of fronds.
- Sori naked or more often covered by an indusium when young, sometimes covered by recurved leaf margin.
- Sporangia small, usually long-stalked, opening by means of a small, specialized ring of cells encircling the sporangium (annulus).
- Spores microscopic, all alike.
- Gametophyte minute, green, flat, formed on damp ground, the sex organs usually borne on lower surface.

Key to Polypodiaceae

1. Fertile and sterile fronds not alike (dimorphic), the fertile brown at maturity. *Matteucia*

Fertile and sterile fronds not distinctly dissimilar. 2

2. Sori set on leaf margin; plants often more than 20 dm. tall; fronds bipinnate; southern montane species. *Pteridium*

Sori set in from leaf margin; distribution variable. 3

3. Stipes usually 2-3 times as long as blades; lowest pinnae distinctly asymmetrical in length; indusium absent. *Gymnocarpium*

Stipes mostly shorter than blades; indusium present. 4

4. Small plants, to 25 (30) cm. tall. *Cystopteris*

Plants larger. 5

5. Indusium elongate and flap-like, attached along one margin to a vein below sorus, the margin ciliate. *Athyrium*

Indusium rounded-reniform, attached at a point at the sinus, the margin not ciliate. *Dryopteris*

ATHYRIUM Roth - Lady Fern

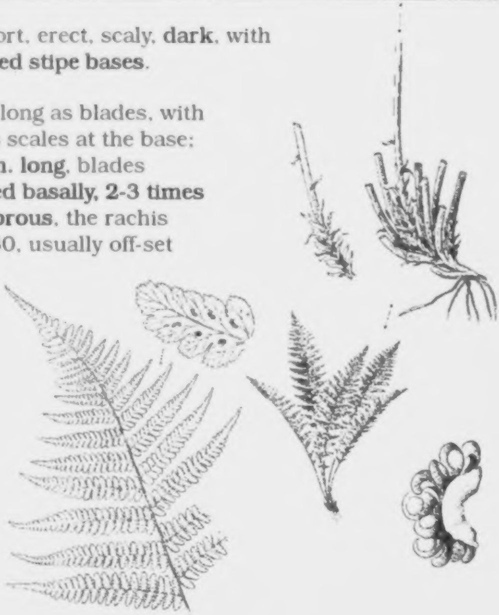
Common Characteristics

- Large ferns from stout, short, erect rhizomes.
- Rhizomes densely scaly, covered by conspicuous, persistent, flattened stipe bases.
- Fronds in vase-like, outcurved clusters.
- Petioles scaly, flattened, with two vascular bundles at the base and a single U-shaped bundle upwards.
- Blades two to four times pinnate, delicate, up to 10 dm. long, the segments mostly pinnatifid.
- Sori not marginal, elongate, curved across veins, sometimes horseshoe-shaped.
- Indusium attached along one side, delicate, sometimes obsolete.

Athyrium filix-femina (L.) Roth var. *cyclosporum* Rupr. - Lady Fern

Growth Habit: Rhizomes stout, short, erect, scaly, **dark**, with **conspicuous flattened stipe bases**.

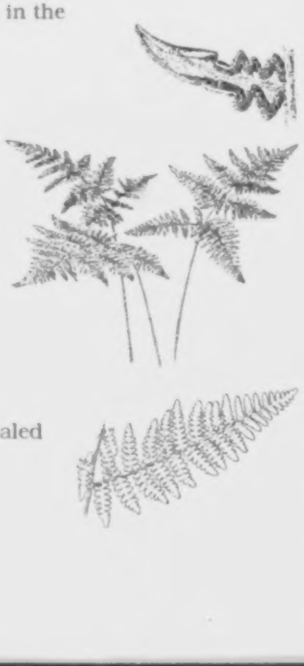
Fronds: Stipes about 1/3 as long as blades, with light brown, fibrous scales at the base; **fronds 2-10 (20) dm. long**, blades acuminate, **narrowed basally, 2-3 times pinnate**, mostly **glabrous**, the rachis pale; pinnae in 20-30, usually off-set pairs, the largest to 15 cm. long; pinnules **pinnatifid to serrate; veins evident** with a 10 X lens.



Sori: Sori round-elliptic, **indusium reniform/crescent-shaped, ciliate**, usually crossing the veins, **elongate and attached along one margin**.

Similar Species:

1. ***Pteridium aquilinum*** (L.) Kuhn. var. ***pubescens*** Underw. - Bracken Fern
   Found in wooded montane regions in the southern Rocky Mountains.
   Distinguished as follows:
   - Large plants from creeping rhizomes.
   - Fronds firm, to 20 (or more) dm. long, triangular in outline, 2-6 dm. broad.
   - Blades 2-3 pinnate, pinnae opposite, pinnules alternate, the ultimate segments with revolute margins.
   - Sori on margins, continuous along the revolute margin.
   - Indusium ciliate, mostly concealed by the sporangia.
   - Blades hairy below.



Habitat & Distribution: Locally abundant in the central boreal forest and southern Rocky Mountains. Grows in moist woods and thickets, along streams. Indicators of lush mixedwood ecosites.

Forage Value: Poor, generally not rated as having significant grazing value; most of our ferns that occur in primary rangeland are non-toxic, with the one exception being bracken fern; the poisonous principle has been identified as the enzyme thiaminase, which apparently causes a thiamine deficiency; actual cases of poisoning are usually restricted to situations in which good alternative forage is scarce, or when bracken is fed in hay; ingestion of relatively large quantities of contaminated forage is required before symptoms appear.

Grazing Response: Increasers, capable of reproducing vegetatively as well as by spores which are microscopic in nature and readily air-borne.

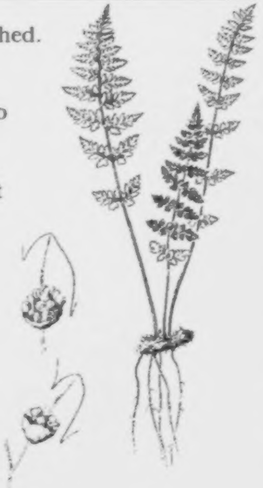
Notes: From the Greek *a-theos*, translating "without a shield", a reference to the absence of a shield-shaped indusium; *filix* is the Latin term for fern, *femina*, alluded to by the common name; some of our more spectacular ferns, both bracken and lady fern grow readily under cultivated conditions in moist, shaded areas, but must be kept in check because of their rather aggressive nature; bracken is especially known as a pioneer on disturbances and in clearings where it is best adapted and in these cases is of some value as vegetation cover until the original plant communities re-establish; the young fiddleheads of lady fern are edible, bracken on the other hand, is toxic to humans, the milk from affected cows also containing some poisonous properties.

CYSTOPTERIS Bernh. - Bladder Fern

Common Characteristics

- Plants from slender, scaly, creeping rhizomes.
- Fronds rather small, delicate, clustered or scattered.
- Stipes slender, straw-colored, scaly at the base, with two bundles that extend to the base of the blade.
- Blades 2-3 times pinnate, the veins reaching the margin.
- Sori not marginal, rounded.
- Indusium hyaline, attached at one side and partially under the sorus, early withering.

Cystopteris fragilis (L.) Bernh. - Bladder Fern



Growth Habit: Rhizomes thickened, light brown, unbranched.

Fronds: **Fronds tufted, usually 10-25 cm. long, broadly lanceolate, 2-3 pinnate**, glabrous to inconspicuously glandular; stipes brittle, pale, shorter than the blade; pinnae **ovate-lanceolate**, pinnatifid to toothed, somewhat offset, **members of basal pairs nearly equal in length**.

Sori: Sori not marginal, rounded; indusium **hyaline, hood-like, attached at one side, delicate**.

Subspecies:

1. Ssp. ***fragilis***: Spores spiny.
2. Ssp. ***dickieana*** (Sim.) Hyl.: Spores rugose.

Habitat & Distribution: Rather common and widespread, absent from the prairie region and uncommon in the northern boreal forest. Grows on moist ledges and slopes, in rock crevices, usually in shaded or sheltered and often calcareous places.

Forage Value: Poor, and seldom available to grazing animals due to habitat.

Grazing Response: Increasers.

Notes: The generic name from the Greek *kystis*, bladder, and *pteris*, fern, this and the common name alluding to the hood-like indusium; although small in size and sometimes overlooked, bladder fern is very attractive and grows readily in moist rocky places; locally, it can be considered as one of our most successful and widely distributed fern species. *Note:* Another rather common genus, *Woodsia*, is represented by a number of species locally, most of these at higher elevations, many often on rocky outcrops; the genus differs in having a basally attached indusium, under sporangia, and stipe bases more evidently persistent.

DRYOPTERIS Adans. - Shield Fern

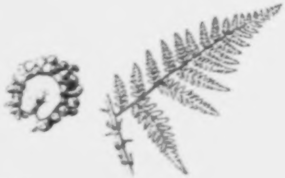
Common Characteristics

- Medium to large woodland ferns, from short, stout horizontal to erect rhizomes.
- Rhizome with chaffy scales, and covered with old stipe bases.
- Fronds all similar, firm, 1-3 pinnate, deciduous to evergreen, clustered at the ends of rhizomes.
- Stipes scaly, stout, not jointed to rhizome.

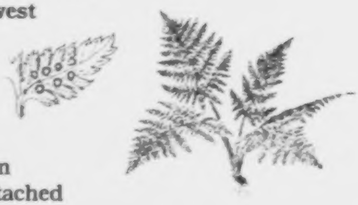
- Blades glabrous to somewhat glandular, veins not quite reaching the margin.
- Pinnae usually obliquely inserted on rachis.
- Sori round, inserted on veins, not marginal.
- Indusium present and persistent, round-reniform, not ciliate, attached on one side by a deep notch (sinus).

Dryopteris carthusiana (Vill.) H.P. Fuchs - Narrow Spinulose Shield Fern

Growth Habit: Rhizome short, mostly ascending.



Fronds: Fronds clustered, essentially glabrous, **2-5 (10) dm. long, oblong-lanceolate**; petioles stout, mostly shorter than blades, with **brownish, uniformly colored scales**; blades not evergreen, **bipinnate-pinnatifid, spinulose-toothed, the basal pinnule on lowest pinnae not much larger than the one opposite; lower pinnules decurrent, forming a distinctly winged rachis**.



Sori: **Sori rounded**, on veins; **indusium rounded-reniform, not ciliate, attached on one side by a deep notch, small**.

Habitat & Distribution: Common in the boreal forest, with some occurrences in the southern Rocky Mountains. Found in moist woods, on streambanks, in moist meadows; along with lady fern and oak fern, the species is often an indicator of moist, fertile mixedwood slopes.

Forage Value: Poor, generally rated as an insignificant grazing species; the related male fern (*D. filixmas*) has been found to contain the toxic substance thiaminase, although actual cases of poisoning have not been documented.

Grazing Response: An increaser.

Notes: Syn. *D. spinulosa*; the generic, from the Greek *drys*, oak, and *pteris*, fern; a relatively large genus globally; *D. carthusiana* is frequently and successfully transplanted into wild gardens provided they are not in full sunlight and moisture conditions are favorable.

GYMNOCARPIUM Newman - Oak Fern

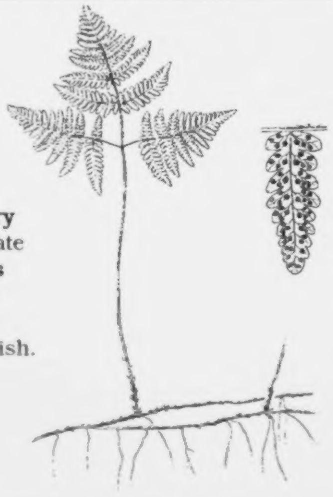
Common Characteristics

- Plants from slender, elongate, blackish scaly rhizomes, the scales rather sparse, entire.
- Stipes slender, longer than blades, straw-colored, with a few scales toward the dark base.
- Stipes with two bundles throughout.
- Blades thin, glabrous to glandular, triangular to five-sided, 2-4 times pinnate with opposite pinnae.
- Lowest pinnae jointed at base, long-stalked.
- Veins forked, reaching the margin.
- Sori round, on veins, near but not on margin.
- Indusium absent.

Gymnocarpium dryopteris (L.) Newm. var. ***disjuncta*** (Rupr.) Ching - Oak Fern

Growth Habit: Rhizomes blackish, with appressed brownish scales.

Fronds: Fronds delicate, **glabrous** or minutely glandular on rachis, **deltoid-pentagonal, 5-25 cm. broad and 5-18 cm. high**; stipes shiny, filiform, **1-3 dm. long; primary blade divisions stalked, three**, pinnate to bipinnate, **the two lower divisions nearly as long as the terminal, their lowest pinnae distinctly unequal in length, asymmetrical**; pinnules acutish.



Sori: Sori rounded, near but not on margins; **indusium absent**.

Habitat & Distribution: Common in the boreal forest, also found in Cypress Hills, in the southern Rocky Mountains, and scattered northward. Grows in moist woods and thickets, on slopes, on moist cliffs. An indicator of favorable moisture and soil nutrients.

Forage Value: Poor.

Grazing Response: An increaser, often forming large mats in wooded areas.

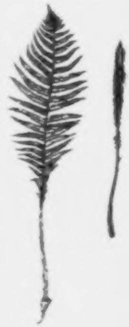
Notes: From the Greek *gymnos*, naked, and *karpos*, fruit, a reference to the absence of an indusium; the specific and common names actually originate from *drys*, oak, the genus sometimes lumped with *Dryopteris*; as a low growing, mat-forming species, oak fern is prized as ground cover in its natural habitats as well as in shaded, moist gardens, effective in out-competing weedy annuals that might otherwise persist.

MATTEUCCIA Torado - Ostrich Fern

Matteuccia struthiopteris (L.) Torado - Ostrich Fern

Growth Habit: Rhizomes creeping, forked, with brown scales, producing black underground stolons and an erect caudex; **old stipe bases persistent at base of plant.**

Fronds: **Fronds not alike, the sterile green, clustered in whorls, 0.5-1.5 (2) m. tall**; stipes much shorter than blades, channeled, scaly when young; blades gradually narrowed and vase-like at the base, abruptly acuminate at apex; blades **pinnate-pinnatifid**, spreading; **fertile fronds shorter (2-6 dm. tall), rigid and coarse, erect, olive green but turning brownish-black at maturity**; stipes dark brown, often nearly equalling fronds in length; fronds pinnate, the pinnae crowded, to 5 cm. long, wavy, segmented.



Sori: Sori several per segment, **covered by rolled pinnae margin; indusium** present but **inconspicuous, hyaline, hood-like, lacerate**.

Habitat & Distribution: Most common in the southern boreal forest, with some occurrences northward. Found in low, open woods, wet thickets, in rather rich, alluvial, moist woods.

Forage Value: Poor, possibly palatable when young, before full expansion of fronds.

Grazing Response: Increasers.

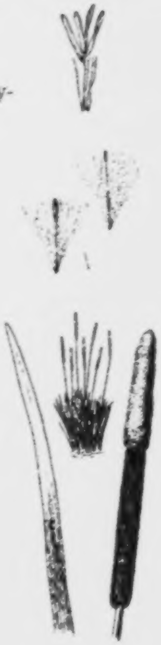
Notes: *Matteuccia* is traditionally considered to be the fiddlehead fern, still a delicacy today and found frozen as a specialty item in large supermarkets; the young shoots are high in nutrients including potassium and iron, also contain significant amounts of vitamin C; caution must be taken, however, not to confuse ostrich fern with the toxic bracken, which can cause fatalities in livestock and humans; ornamental value of *Matteuccia* is considerable, the plants somewhat unique in appearance with their larger, green sterile fronds and short, dark-tinged fertile shoots.

TYPHACEAE - Cattail Family
TYPHA L. - Cattail

Common Characteristics

- Semi-aquatic species with stout creeping roots.
- Leaves alternate, broad, sheathing, spongy.
- Flowers imperfect and without perianth, in cylindrical spikes, the staminate above.
- Achenes stalked, hairy.

Typha latifolia L. - Common Cattail



Growth Habit: Plants with **stout, extensive creeping root systems**; stems **1-1.5 m. tall**, rounded, smooth.

Blades: Alternate, **8-20 mm. broad, linear**, elongate, **flat**, grey-green, smooth, **thick and spongy**, sheathing.

Inflorescence: Spikes **large, conspicuous, cylindrical, brown, staminate flowers at top**, but not separated from pistillate by a space; staminate flowers composed of 1-7 stamens and intermixed hairs, with short, united filaments and pollen grains in 4's (tetrads); pistillate portion of spike brown, rough but not bristly, without a bract below, **achenes surrounded by fluffy hairs**.

Habitat & Distribution: Very common throughout all regions. A wetland species, found on shores, river banks, in marshy areas, on wet roadside ditches, around sloughs, often in shallow water. Frequently forms large and exclusive colonies.

Forage Value: Poor to fair for grazing animals, overall low utilization a result of inaccessibility of wetlands and poor palatability; the value of the species lies primarily in the fact that it provides essential habitat and food for wetland wildlife such as small mammals, black birds, marsh wrens and water fowl.

Grazing Response: An increaser, at times replacing more valuable forage species and in these cases undesirable.

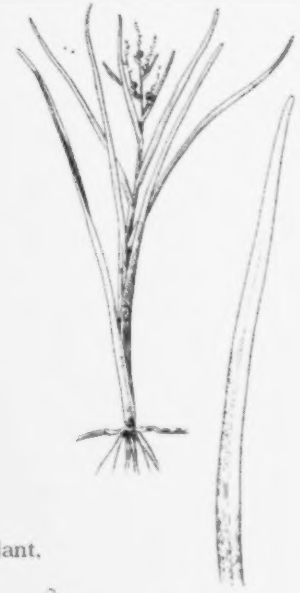
Notes: From the Greek *typhe*, the ancient name for the plant, appropriately translating "of the bog"; *latifolia*, a reference to the broad leaves; cattails have been extensively and variously used, the young shoots and flower stalks eaten, the pollen used as flour, and the roots cooked and dried and ground into flour; root poultices were applied to wounds and various skin problems, and taken internally to treat dysentery and diarrhea; cattail leaves were woven into various articles, and the fluff valued as insulation, padding, stuffing for bedding, and tinder; *T. latifolia* is recommended as a species for revegetating wetlands, both because of its remarkable soil binding properties and fast growth, also because of its value to wildlife; as well, *Typha* species are known for their exceptional ability to remove nitrogen and phosphorus from bodies of water; plants are most easily propagated by root sprigs, although problems in accessing the wet habitats will remain an obstacle to development of the species on a commercial scale; in areas where the production of ungulate forage is a priority, less aggressive more palatable species should be seeded.

SPARGANIACEAE - Bur-reed Family
SPARGANIUM L. - Bur-reed

Common Characteristics

- Creeping perennials, aquatic or shoreline species.
- Stems floating in most species.
- Leaves elongate, erect or floating, basally sheathing, 2-ranked.
- Flowers in prickly globose, unisexual heads.
- Lowermost heads pistillate, upper staminate.
- Staminate flowers without evident perianth (with small scales).
- Pistillate flowers with 3-5 sepals, styles 1 or 2.
- Achenes in prickly heads, mostly beaked, with 1 or 2 seeds.

Sparganium eurycarpum Engelm. - Giant Bur-reed



Growth Habit: **Robust, erect plants 4-15 dm. tall.**

Blades: Leaves **firm**, often somewhat keeled, **5-12 mm. wide, with evident cross veins**, especially on sheaths.

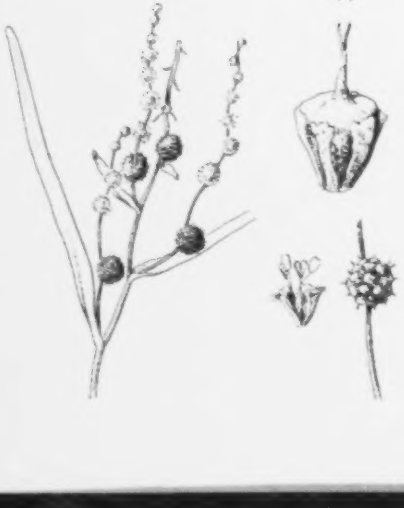
Inflorescence: Lowest 1-4 heads pistillate, **prickly-globose, to 3 cm. across at maturity**; upper staminate heads few to about 12; **stigmas 2; achenes round in cross-section, truncate at apex and capped by stout beak**.

Habitat & Distribution: Most common in southern boreal regions, scattered elsewhere, absent from the prairies. Grows partly submersed for most of the year, often a shoreline species as water levels recede by fall.

Forage Value: Poor for ungulates, generally not abundant, although, because of its amphibious nature, is sometimes accessible.

Grazing Response: An increaser.

Notes: From the Greek *sparganion*, band, supposedly a reference to the narrow leaves; one of 15 or so species in North America, most of which are true aquatics with floating leaves.



POTAMOGETONACEAE - Pondweed Family
POTAMOGETON - Pondweed

Common Characteristics

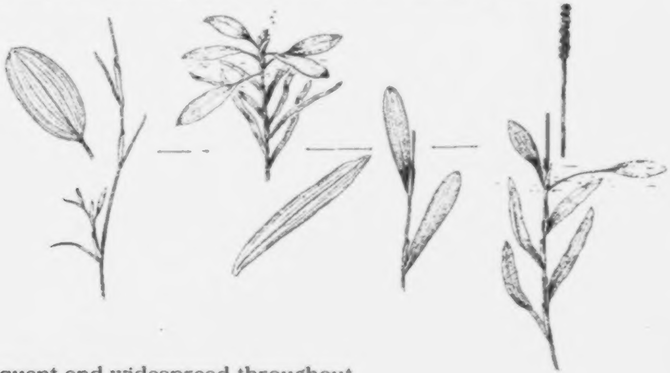
- Aquatic plants, stems jointed and rooting.
- Leaves alternate (uppermost opposite), the submersed narrower, fragile, floating leaves, when present, firmer and often broader.
- Stipules evident, membranous.
- Flowers perfect, in congested clusters, on stalks reaching water surface.
- Flowers greenish, whorled, ovaries and stamens each 4.
- Fruit small (to 5 mm. long), fleshy and enclosing a nutlet.
- Vegetative reproduction common in some species (buds, tubers).

Potamogeton gramineus L. - Pondweed

Growth Habit: Branched, rather slender plants, stems to 1 mm. thick.

Blades: Blades **green, of 2 types, submersed linear to narrowly oblanceolate, sessile**, 1-11 cm. long, **with 3-7 (9) nerves; floating leaves thick, ovate/elliptic, 2-5 cm. long, 13-19 nerved, with evident, elongate petioles; stipules not early disintegrating**.

Inflorescence: Flower spikes 1-2.5 cm. long, on robust stalks to 4 cm. long; fruit to 2.5 mm. long, keeled, with short, curved beaks.



Habitat & Distribution: Frequent and widespread throughout most regions. Aquatic.

Forage Value: Poor.

Grazing Response: Seldom impacted by ungulate utilization.

Notes: From *potamos*, river, and *geiton*, neighbour, in reference to habitat; a common family of about 100 species globally; *P. gramineus*, although not our most common pondweed.

is more readily visible than many species that lack broader, floating leaves; for the purposes of a rangeland text, treatment of true aquatics is minimal, including only the most common families, and within these groups making mention of only a few representative species; locally our primary rangelands rarely involve significant acreages of submersed vegetation as a major source of ungulate forage.

JUNCAGINACEAE - Arrow-grass Family
TRIGLOCHIN L. - Arrow-grass

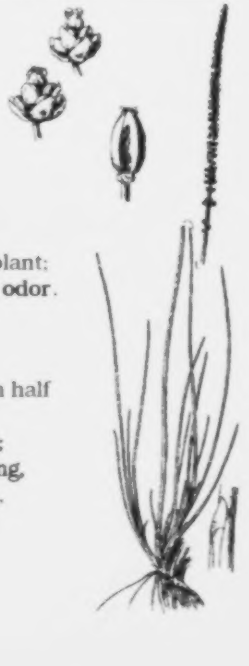
Common Characteristics

- Rhizomatous perennials of wet brackish or alkaline habitats.
- Leaves grass or rush-like, linear, basal, sheathing, fleshy.
- Flowers in elongate spikes.
- Flowers perfect, perianth in two whorls of 3 segments each.
- Stamens 5, stigmas and carpels 3 or 6, the carpels feathery.
- Fruit of 3-6 follicles, each with a single elongate seed.

Key to Triglochin

1.	Stigmas and carpels each 3; fruit elongate-linear, 5-7 mm. long, tapered basally; fruit axis winged.	*T. palustris*
	Stigmas and carpels each 6; fruit oblong-ovoid, about 5 mm. long, rounded basally; fruit axis without wings.	*T. maritima*

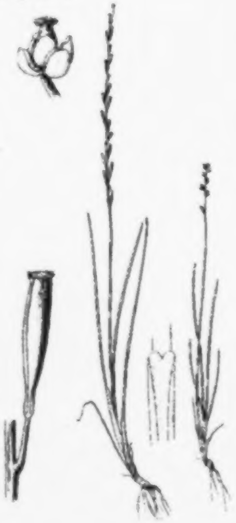
Triglochin maritima L. - Arrow-grass



Growth Habit:	Plants with **stout rhizomes**, these **often woody**; stems **3-8 dm. tall**, smooth, **leafless**.
Blades:	**Linear, 1.5-2.5 mm. wide**, up to 5 dm. long, shorter than culms, somewhat flattened, **blunt**.
Sheaths:	Open, smooth, the margins pale, tawny, old sheaths persistent and **shredded** at base of plant; **base of sheaths and crown of plant with foul odor**.
Ligules:	**1.5-4 mm. long**, entire to shallowly lobed.
Inflorescence:	Racemes **spike-like, 1-4 dm. long**, more than half the total plant length; perianth in 2 whorls of 3 segments each; stalks **curved-ascending; stigmas and carpels each 6**; fruit **ovoid-oblong, about 5 mm. long**, breaking into 3-6 follicles, revealing a rounded unwinged axis; follicles **completely deciduous**.

Similar Species:

1. ***Triglochin palustris*** L. - Slender Arrow-grass
   Frequent throughout, found in similar habitats.
   Differs as follows:
   - Rhizomes slender, stems more slender, 1.5-6 dm. tall.
   - Blades 1-2 mm. wide, sharp pointed.
   - Ligules to 1.5 mm. long.
   - Racemes slender, 1-2 dm. long to 1/2 the plant height.
   - Flower stalks erect.
   - Stigmas and carpels each 3.
   - Fruit linear, 5-7 mm. long.
   - Fruit axis winged, the fruit remaining attached at the tip.



Habitat & Distribution:

Common throughout all regions. Found in wet places, usually in brackish or calcareous habitats such as in seepages, in marshy or boggy areas.

Forage Value:

Poor, arrow-grass species considered very poisonous to all livestock and to game; because the species can be palatable, particularly when animals crave salt or are hungry or thirsty, actual cases of poisoning can be high; the toxic principle, hydrocyanic acid, develops in plants after injury, drought and frost, and the ingestion of lethal quantities causes respiratory failure; hay containing arrow-grass is also potentially dangerous as the poisonous principle does not dissipate after drying.

Grazing Response:

Increasers.

Notes:

From the Greek *treis*, three and *glochis*, point, alluding to the 3-pointed fruit of some species, *maritima* referring to the sea, and the species' adaptation to moist saline sites; in spite of the highly toxic properties of the genus, some species were supposedly used by native people, both vegetative portions of plants and seeds consumed.

ALISMATACEAE - Water-plantain Family

Common Characteristics

- Fibrous-rooted wetland plants.
- Stems leafless.
- Leaves long-stalked, broad, nerves evident, leaves sometimes floating; ligules absent.
- Panicles with whorled branches.
- Sepals and petals each 3, petals showy, white to pinkish, early deciduous.
- Stamens 6 or more, pistils several-many.
- Fruit an achene.

Key to Alismataceae

1.	Leaves without differentiated blades in submersed plants, otherwise sagittate (arrow-shaped); stamens more than 6; pistils (achenes) numerous in a globose head on receptacle.	*Sagittaria*
	Leaves broadly lanceolate to ovate; stamens about 6; receptacle flat, with one whorl of achenes.	*Alisma*

SAGITTARIA L. - Arrowhead

Common Characteristics

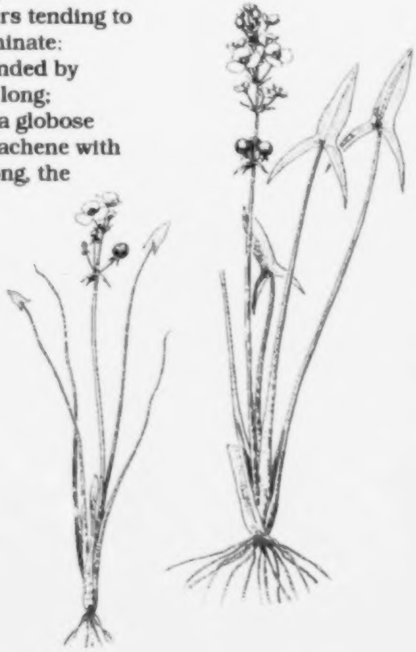
- Mostly rhizomatous, tuberous perennials.
- Blades sheathing at base, elevated blades sagittate-lobed at base.
- Flowers usually unisexual, 3-whorled, the upper staminate, lower pistillate.
- Petals showy, white, longer than sepals.
- Stamens and carpels numerous, the latter becoming flattened, winged achenes arranged in dense globose heads.

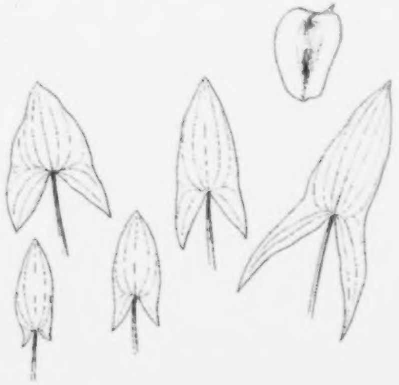
Sagittaria cuneata Sheld. - Arrowhead

Growth Habit: Rhizomatous, tuber producing plants 2-4 dm. tall.

Blades: **Elevated leaves sagittate (arrow-shaped) with terminal segment longer than basal lobes.**

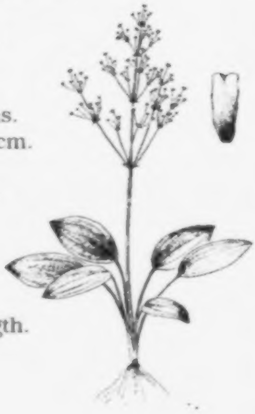
Inflorescence: Panicles with flowers mostly in whorls of 3 on branches, **lowest flowers tending to be pistillate, the upper staminate;** flowers **white, showy, subtended by lanceolate bracts 0.5-4 cm. long; stamens 10-18; achenes in a globose head to 1.5 cm. wide, each achene with an erect beak to 0.5 mm. long, the bodies 2-2.5 mm. long.**





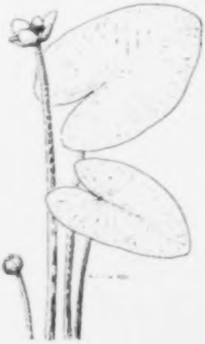
Similar Species:

1. ***Alisma plantago-aquatica*** L. var. ***americanum*** Schultes & Sch. - Water-plantain
Widely distributed and common, found on shores, in shallow water.
Distinguished as follows:
    - Plants from fibrous roots and corms.
    - Elevated leaves ovate-elliptic, 5-15 cm. long, on long stalks.
    - Inflorescence projecting well above leaves, branches erect.
    - Flowers perfect, in whorls, with 3 greenish sepals and 3 white or purplish deciduous petals.
    - Stamens 6-9, up to twice ovary length.
    - Achenes flat.

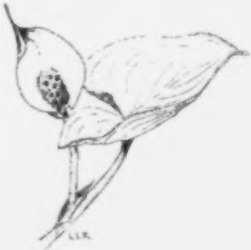


Other Species:

1. ***Nuphar variegatum*** Engelm. -
Yellow Pond Lily; Water Lily
Common except in the prairie region, found in lakes and ponds.
Distinguished as follows:
    - Aquatic plants with extensive rhizomes.
    - Leaves 1-3 dm. long, ovate, cordate, floating, about 1 dm. wide.
    - Flowers long-stalked, solitary, large (to 7 cm. broad).
    - Sepals 6, petal-like, yellow, petals small, numerous.
    - Stamens numerous, yellow.
    - Fruit with many seeds, the fruit to 4 cm. long.



2. ***Calla palustris*** L. - Wild Calla; Water Arum
An unrelated species taxonomically, but lily-like, a member of *Araceae*, the arum family. Primarily a boreal species, found on slough margins, in boggy places.
Distinguished as follows:
    - Perennials 1-2 dm. tall, from extensive rhizomes.
    - Leaves basal, round-ovate, cordate, on long stalks.
    - Flowers in fleshy spikes (spadix), at apex of stems.
    - Floral bract (spathe) large, showy, white, ovate, pointed.
    - Flowers perfect or uppermost staminate.
    - Perianth absent.
    - Stigma round, ovary 1-loculed, becoming red, berry-like, the fruits in dense clusters.



Habitat & Distribution: Common throughout most ecoregions, found on shores, in shallow water.

Forage Value: Fair

Grazing Response: Increasers under normal conditions, members of the family can decline when shoreline and riparian sites are very heavily utilized.

Notes: The generic term is derived from the Latin *sagitta*, arrow, referring to leaf shape; members of the genus were historically used by native people, the tubers boiled or roasted or ground into flour; the tubers are a well-known source of food for water birds and for this reason they are valued, and in some areas the species is re-introduced into wetlands.

LILIACEAE - Lily Family

Common Characteristics

- Monocotyledons, leaves with parallel venation.
- Flowers perfect.
- Perianth of two similar whorls of 3 segments each, conspicuous.
- Fruit a berry or capsule.

Key to Liliaceae

1. Leaves narrow, linear or linear-lanceolate; fruit dry. 2

Leaves lanceolate or broader; fruit dry or juicy. 10

2. Flowers 1-3(5). 3

Flowers more than 3, often numerous. 5

3. Petals to 2.5 cm. long, bearded internally, pale yellow-white; southern Rocky Mountain species. *Calochortus*

Petals yellow-orange. 4

4. Plants 1-3 dm. tall, petals yellow, not exceeding 2.5 cm. long. *Fritillaria*

Plants 3-6 dm. tall, petals red-orange, 5-7 cm. long. *Lilium*

5. Plants with an onion odor, flowers in umbels or head-like. *Allium*

Onion odor absent, flowers in racemes. 6

6. Petals blue, conspicuous, to 2 cm. long; southern Rocky Mountain species. *Camassia*

Petals not blue. 7

7. Leaves linear, tough, fibrous, numerous, with rough margins; southern Rocky Mountain species. *Xerophyllum*

Leaves not tough, generally rather few; widespread. 8

8. Flowers greenish to bronze, drooping; woodland plants. *Stenanthium*

Flowers not bronze, not drooping. 9

9. Plants from bulbs; leaves with their surface facing the stem. *Zigadenus*

Plants without bulbs; leaves with their edges facing the stem; of moist, often calcareous sites. *Tofieldia*

10. Stems with much reduced or no leaves; Rocky Mountain species. 11

Stems with well developed leaves; widespread except *Veratrum* mostly in Rocky Mountain region. 12

11. Flowers white; fruit a dark blue juicy berry. *Clintonia*

Flowers yellow; fruit a dry capsule. *Erythronium*

12. Plants tall, often more than 1 m. high; flowers numerous, small, greenish; fruit dry. *Veratrum*

Plants much shorter; flowers yellowish-white; fruit juicy. 13

13. Flowers rather few, solitary in leaf axils or 1-4 at ends of branches. 14

Flowers more numerous and/or at ends of stems, in racemes or panicles. 15

14. Flowers 1-4 at ends of branches, pale yellow-greenish. *Disporum*

Flowers in leaf axils, greenish-white to reddish. *Streptopus*

15. Flower parts in 2's; small woodland plants. *Maianthemum*

Flower parts in 3's; habitat variable. *Smilacina*

ALLIUM L. - Onion

Common Characteristics

- Plants from bulbs usually covered by a fibrous coat; plants with strong onion odor.
- Leaves linear, all basal.
- Flowers in umbels or heads.
- Fruit a small ovoid capsule containing small black seeds.
- Bulblets sometimes replacing flowers in some species.

Key to Allium

1. Leaves rounded in cross section, hollow, at least basally; inflorescence mostly head-like (capitate); ovary without crests. *A. shoenoprasum*

Leaves flat-channeled, not hollow; inflorescence in umbels; ovary with crests. 2

2. Outer bulb coats without reticulate fibers; umbels nodding, often pink. *A. cernuum*

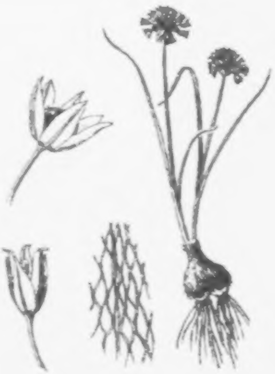
Outer bulb coats with reticulate fibers; umbels mostly erect, mostly white. *A. textile*

Allium textile Nels. & Macbr. - Prairie Onion

Growth Habit: Plants from ovoid, usually **clustered bulbs**, the **outer coats grey-brown, fibrous, net-veined**; stems 0.5-3 dm. tall, mostly rounded, **not nodding at the top**.

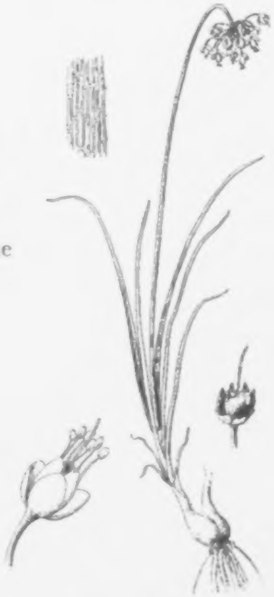
Blades: 1.5 mm. wide, often equalling to exceeding culms, **flattened, usually 2 per culm**.

Inflorescence: Umbels **erect**, with **bracts prominent**, 1-nerved, ovate, long-pointed; **perianth segments white** (rarely pink), the midribs reddish, 5-7 mm. long; stamens shorter than perianth; ovary with 6 round knobs, these often obsolete in fruit; **seeds black, shining**.



Similar Species:

1. ***Allium cernuum*** Roth - Nodding Onion
Common in the foothills and Rocky Mountain regions, also occurs in the parkland region and occasionally in the prairies. Found on open, often rocky slopes, in open woods, in fescue grassland, on subxeric sites in montane regions.
Differs as follows:
    - Bulbs not fibrous-net-veined.
    - Umbels nodding, often pink.
    - Stamens exserted.
    - Capsules abruptly bent upward, with 6 crests at the top.

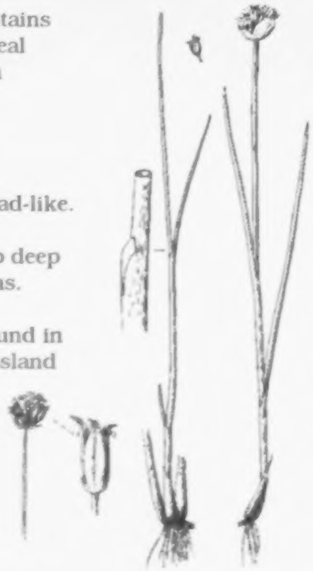


2. ***Allium schoenoprasum*** L. var. ***sibiricum*** (L.) Hartm. - Wild Chives

Most common in the Rocky Mountains with some occurrences in the boreal forest. Grows in wet meadows, on calcareous rocky shores.

Distinguished from all other *Allium* species:

- Leaves terete, hollow basally.
- Inflorescence more or less head-like.
- Ovary without crests.
- Perianth conspicuous, pink to deep purple and with dark midveins.



Habitat & Distribution: Common across southern regions. Found in open grassland, from lush fescue grassland in the foothills to dry prairie areas. Also grows on dry hillsides and rocky slopes.

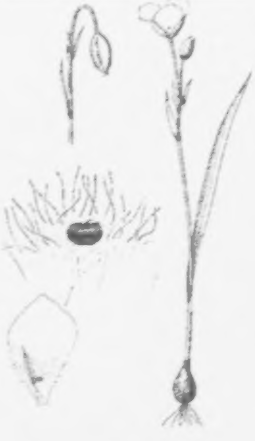
Forage Value: Fair, sometimes grazed but overall forage production is low; bulbs are a choice food of grizzly bears.

Grazing Response: Increasers.

Notes: *Allium* is the Latin name for garlic, another member of the genus; bulbs of wild onion species were used extensively by native people, gathered in the spring and cooked, boiled with meat, or dried for later use, also consumed because of their natural antiseptic and antibacterial properties.

CALOCHORTUS Pursh

Calochortus apiculatus Baker - Mariposa Lily



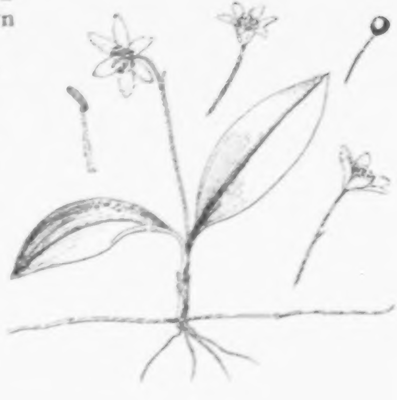
Growth Habit: Essentially **scapose plants** 1-3 dm. tall, glabrous, **from ovoid bulbs**, these with membranous scales.

Blades: **Leaf basal, linear, solitary, 5-15 mm. broad**, shorter than stems, glabrous.

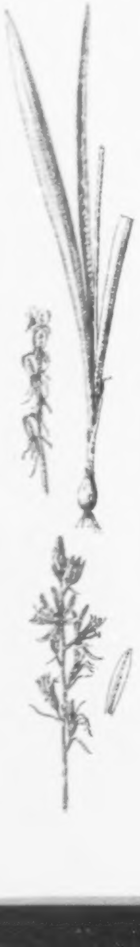
Inflorescence: **Flowers 1-4 per scape, 2-2.5 cm. long, yellowish-white**, occasionally with purple lines; petals obovate-oblanceolate, **fringed within and along sides**; glands present on petals near the base; sepals oblong-lanceolate, shorter than petals; **capsules nodding, 3-angled, oblong**, many-seeded.

Other Species:

1. ***Clintonia uniflora*** Raf. - Clintonia
   A species of moist wooded areas, also in the southern Rocky Mountains.
   Distinguished as follows:
   - Small plants to 15 cm. tall, without bulbs, creeping.
   - Leaves 8-20 cm. long, oblanceolate, 2-5 per plant near the base.
   - Flowers mostly solitary, white.
   - Sepals and petals similar, about 2 cm. long.
   - Fruit a nearly spherical dark blue berry 8-10 mm. wide.



2. ***Camassia quamash*** (Pursh) Greene var. ***quamash*** - Blue Camas
   Restricted to the southern Rocky Mountain region, found in wet meadows, depressional grassland. Occurrences are often erratic, in some areas abundant, and in similar adjacent sites sporadic or absent. This may correlate to historic human distribution patterns where some populations would have been depleted while others might have remained undiscovered.
   Distinguished as follows:
   - Glabrous plants from bulbs, 3-6 dm. tall.
   - Bulbs to 3 cm. across, dark-scaly.
   - Leaves basal, in whorls, linear, to 4 dm. long.
   - Flowers several in terminal racemes, to 2 cm. long.
   - Petals and sepals similar, deep blue-purple.
   - Fruit a capsule, elliptical, 3-angled, 15-18 mm. long, with black seeds.



Habitat & Distribution:

Restricted to the southern Rocky Mountains where locally abundant in dry open woods, on dry slopes.

Forage Value:

Poor for *Calochortus* and *Clintonia*, the former especially producing little foliage and this dries up early in the season; *Camassia* rates somewhat higher in terms of palatability, particularly when growing in wet places where it remains succulent for a more prolonged period of time.

Grazing Response: Increasers (*Clintonia* and *Calochortus*), some *Calochortus* species especially known to increase in western and southern regions in response to declining range condition; blue camas can be classed as an increaser #1, as it is more often utilized, more site specific, and appears to decline with heavy grazing pressure.

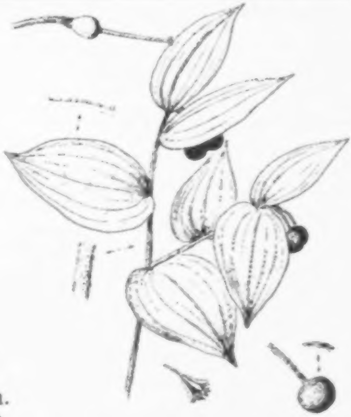
Notes: *Calochortus*, from the Greek *kalo*, beautiful, and *chortus*, grass, appropriately describing the genus, which, in western North America, boasts about 60 species; bulbs of both mariposa lily and blue camas were prized as food plants by native people, often occurring in such abundance as to be dried and stored in significant quantities for winter use; traditional folklore confirms the importance of both mariposa and camas to native peoples, the former causing tribal wars over its possession; camas was essentially sacred, root gathering competitions held among young women (the prize, to marry a prominent brave), improper cooking of the root supposedly causing the death of a relative of the cook, and men cursed if approaching the cooking pot too closely; camas root has a high sugar content, and frequently caused indulgences and the consequent unpleasant purgative and emetic side effects; propagation of *Calochortus* species from bulbs, in particular, has shown only limited success, and, like blue camas, is best propagated from seed (although still slow to establish); *Clintonia* is more readily transplanted due to strong rhizome growth, and, as previously noted, some species are relatively aggressive on disturbed and depleted sites.

DISPORUM Salisb. - Fairy-bells

Common Characteristics

- Perennials from long rhizomes.
- Leaves sessile, clasping, ovate-lanceolate.
- Flowers 1-4, greenish-white, at tips of branches.
- Stamens and perianth segments each 6.
- Ovary 3-loculed.
- Fruit a reddish berry.

Disporum trachycarpum (S. Wats.) B. & H. - Fairy-bells



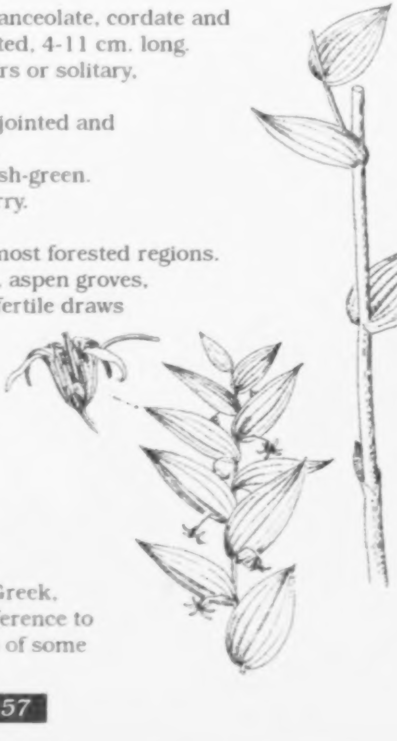
Growth Habit: Plants with creeping rhizomes; stems simple to few branched, hairy, **3-6 dm. tall**.

Blades: Reduced to scales on lower part of culm, **the upper well developed**, sessile, **ovate-oblong**, abruptly acute-short pointed, 4-12 cm. long, mostly glabrous above, usually pubescent below, margins ciliate with spreading hairs.

Inflorescence: **Flowers 1-4 at ends of branches, yellowish-green to white, 1-1.5 cm. long**; perianth segments narrow, 6, equal; stamens 6, equal to or only slightly surpassing petals; **fruit a spherical berry**, glabrous but **distinctly papillose, deep red at maturity** (yellow-orange when immature); **stigmas distinctly 3-cleft**.

Similar Species:

1. ***Streptopus amplexifolius*** (L.) DC. - Twisted-stalk
   Common in western regions, the parkland, boreal forest and in the Cypress Hills. Grows in moist woods, in montane thickets, along wooded streams.
   Differs as follows:
   - Leaves ovate-lanceolate, cordate and clasping, pointed, 4-11 cm. long.
   - Flowers in pairs or solitary, in leaf axils.
   - Flower stalks jointed and abruptly bent.
   - Perianth whitish-green.
   - Fruit a red berry.



Habitat & Distribution: Common throughout most forested regions. Found in moist woods, aspen groves, wooded slopes, moist fertile draws and coulees, sometimes near streams.

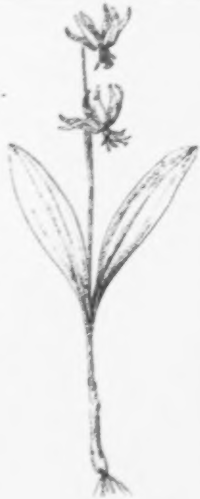
Forage Value: Poor, of little importance as a forage species.

Grazing Response: Increasers.

Notes: The generic name, in Greek, means two seeds, a reference to the two-seeded locules of some species, the specific name, appropriately, translates rough-fruited; fairy-bells was apparently of little value to native North Americans, the berries only occasionally used as a source of food; the characteristic creeping root system enables plants to move onto disturbances to some extent, the species well adapted to sandy soils in the parkland region and especially valuable on these sites; the plants are fairly easy to transplant into shaded gardens, attractive with their delicate flowers and again after fruit formation.

ERYTHRONIUM L. - Glacier Lily

Erythronium grandiflorum Pursh - Glacier Lily; Dog-tooth Violet



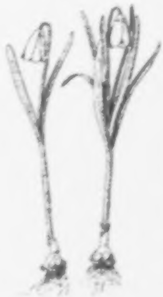
Growth Habit: Plants from **deep-seated bulb-like corms**; stems scapose, simple, 1-4 dm. tall.

Blades: Foliage glabrous, the **leaves usually two per scape, borne basally; blades large (1-2 dm. long), ovate-lanceolate**, acute, narrowed to a short petiole.

Infloresence: **Flowers solitary or few, nodding, large, bright yellow**; sepals and petals similar, **2-5 cm. long, lanceolate**; stamens 6, with slender red-purple to yellowish anthers attached at the summit of the filaments; stigmas 3-lobed; **fruit an oblong-obovoid, dry, bluntly 3-angled capsule**.

Similar Species:

1. ***Fritillaria pucida*** (Pursh) Spreng. - Yellow-bell
   Occasional in the southern prairie and montane regions. Found on moist slopes and in snow melt areas in driest regions, on ridges, in dry open forests at higher elevations.
   Distinguished as follows:
   - Plants 1-3 dm. tall, from scaly bulbs.
   - Leaves rather few, narrow (narrowly oblong-lanceolate).
   - Flowers mostly solitary, nodding, cup-shaped.
   - Petals and sepals 1.5-2 cm. long, yellow, turning orange-red with age.
   - Capsules ovoid-oblong, about 2 cm. long.



Habitat & Distribution: Confined to but rather locally abundant in the southern Rocky Mountains, found from foothills to subalpine elevations. Grows in open aspen/mixedwood forests, in rich meadows and on open, moist slopes.

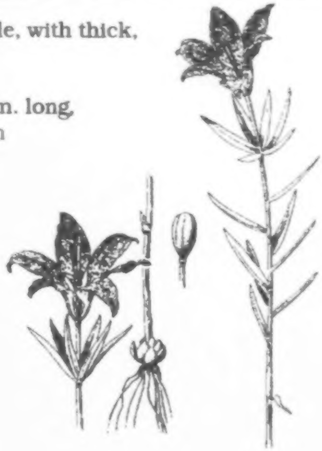
Forage Value: Fair; when abundant, appreciable amounts of forage can be produced, deer noted to be especially fond of both leaves and pods; the bulbs are a choice food of black and grizzly bear, also eaten and stored for winter use by small rodents.

Grazing Response: An increaser #1; when occurring on primary range, heavy and continuous utilization can prevent adequate seed set to maintain populations.

Notes: From the Greek *erythro*, red, alluding to the flower color of some species, *grandiflorum*, a reference to the spectacular flowers; the bulbs of both glacier lily and yellow-bell were part of the diet of native people, and poultices made from *Erythronium* bulbs applied to skin conditions; various *Erythronium* species are known as antiscorbutic, emetic, and the uncooked leaves apparently used as a birth control method by some tribes; all of the dozen or so North American species are of exceptional ornamental value, ranging in color from white, yellow to various shades of pink and purple.

LILIUM L. - Lily

Lilium philadelphicum L. var. ***andinum*** (Nutt.) Ker. - Western Wood Lily



Growth Habit: Plants **from bulbs, these 2-3 cm. wide, with thick, fleshy scales**; stems **2-6 dm.** tall.

Blades: **Numerous, linear-lanceolate, 5-10 cm. long, alternate below, whorled above**, often overlapping, hairless.

Inflorescence: Flowers **large, 1-3 (5), in umbels**, the 6 segments similar, **5-7 cm. long, red to orange and black-dotted on lower part of inner surface**; anthers purple; style 1, the stigma 3-lobed; fruit a **cylindrical capsule 2-4 cm. long**.

Habitat & Distribution: Common except in the dry prairie region and northern boreal forest. Found in open woods, montane and fescue grassland, moist meadows, sometimes on heavy, slightly alkaline soils.

Forage Value: Fair, the plants nutritious and palatable but provide relatively little forage; as with several members of the family, bulbs are relished by grizzly bears.

Grazing Response: A decreaser, not persisting in altered or continuously overgrazed rangeland.

Notes: The generic *Lilium* is the Latinized form of *leirion*, the classical Greek name; *philadelphicum* means "of Philadelphia"; and western wood lily was used rather extensively by native people, the starchy bulb was cooked, the flowers eaten raw, and a tea was made from roots to treat a variety of disorders, or used as a poultice for wounds; western wood lily has an aesthetic appeal as a roadside species, and various members of the family are currently under development; to date, however, most show limited success in propagation trials and may never be available in large quantities.

SMILACINA Desf. - False Solomon's-seal

Common Characteristics

- Perennials from creeping rhizomes.
- Blades relatively broad, cauline, stalkless to short stalked.
- Flowers small, white, several to numerous, in a terminal raceme or panicle.
- Perianth segments 6, stamens 6.
- Fruit a 1-2 seeded spherical berry.

Key to Smilacina

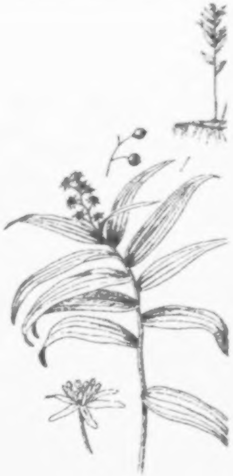
1.	Large plants 3-10 dm. tall; flowers numerous, in a dense panicle.	*S. racemosa*
	Plants smaller; flowers fewer, in racemes.	2
2.	Leaves mostly 3, glabrous; racemes long-stalked, with 3-8 flowers; bog species.	*S. trifolia*
	Leaves at least 6, hairy below; racemes nearly sessile, with 5-8+ flowers; upland species.	*S. stellata*

Smilacina stellata (L.) Desf. - Star-flowered Solomon's-seal

Growth Habit: **Plants mat-forming from extensive rhizomes; stems 2-6 dm. tall, mostly hairless, sometimes zig-zag above.**

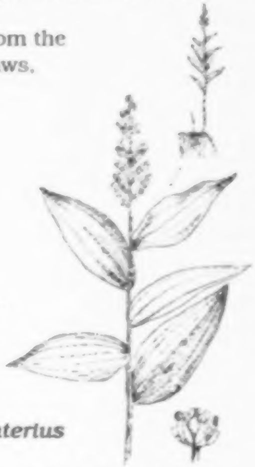
Blades: **Oblong-lanceolate** and often folded vertically, 3-12 cm. long, hairless above, minutely hairy below, 6 or more per stem.

Inflorescence: Inflorescence a nearly sessile **simple, unbranched raceme** 2-5 cm. long, this somewhat zig-zag, **with few to several** flowers; **perianth white, 3-5 mm. long;** stamens shorter than perianth; berries 7-10 mm. long, **greenish with dark stripes, turning black at maturity.**

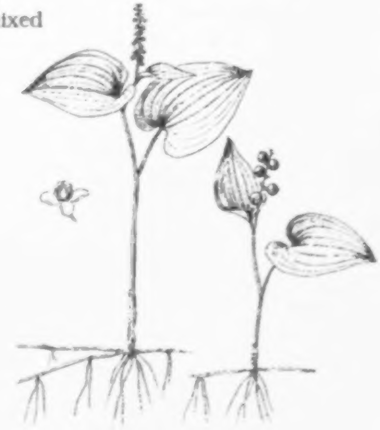


Similar Species:

1. ***Smilacina racemosa*** (L.) Desf. var. ***amplexicaulis*** (Nutt.) S. Wats. - False Solomon's-seal
   Frequent in most ecoregions, absent from the prairies, found in moist woods and draws, in ravines. An indicator of rich, mesic forests.
   Differs as follows:
   - Plants taller (3-10 dm.), the stems hairy.
   - Blades broader (ovate-lanceolate), hairy on both surfaces.
   - Inflorescence a compound panicle.
   - Flowers to 3 mm. long, numerous.
   - Berries reddish, purple-dotted.



2. ***Maianthemum canadense*** Desf. var. ***interius*** Fern. - Wild Lily-of-the-valley
   Common in foothills, parkland, and boreal forest ecoregions. Grows in moist woods and clearings, on coniferous, mixed and deciduous sites.
   Differs as follows:
   - Plants mat-forming, with extensive rhizomes, 5-15 cm. tall.
   - Basal leaf solitary, long-stalked.
   - Stem leaves short-stalked to stalkless, 1-3, ovate-lanceolate and the bases heart-shaped.
   - Flowers white, numerous, small, about 2 mm. long.
   - Flower parts in 2's and 4's (unique for the family).
   - Fruit a reddish speckled berry.



Habitat & Distribution:

Very common throughout and widely distributed. Adapted to a wide variety of habitats; prefers moist and depressional grassland, but sometimes found on well-drained open slopes, in open woods.

Forage Value:

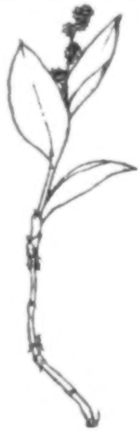
Fair, specific nutritional content unknown, but plants are palatable, especially early in the season, and are sometimes eaten by sheep after curing; under most conditions, however, Solomon's-seal species produce relatively small amounts of forage.

Grazing Response:

Increasers.

Notes: The name Solomon's-seal was originally given to *Polygonatum multiflorum*, the generic name a diminutive of *Smilax*, meaning bind-weed; freshly cut rhizomes show markings resembling a 6-pointed star, the seal of Solomon; also known as false Solomon's-seal; Blackfoot people once gathered and dried the roots, and applied the powder to wounds to help blood-clotting; young vegetative shoots were eaten, and the berries were sometimes used, although they act as a rather strong purgative unless cooked; Solomon's-seal species propagate readily from root sprigs and make attractive ornamentals, also act as natural early successional species on disturbances.

Smilacina trifolia (L.) Desf. - Three-leaved Solomon's-seal



Growth Habit: **Plants spreading by long, slender rhizomes; stems 0.5-2.5 dm. tall, slender, zig-zag above.**

Blades: **Oval to lanceolate-oblong**, 4-10 cm. long, **2-4 (usually 3) per stem, sessile, glabrous** on both surfaces.

Inflorescence: **Raceme long-stalked, with few (3-8) flowers; perianth white, 3 mm. long**; filaments narrow, stamens shorter than perianth; **berries to 6 mm. across, dark red**.

Habitat & Distribution: Common except in the prairie region and southern Rocky Mountains. Found in boggy, mossy woods, on wet shores, in peat; most commonly associated with sphagnum, and an indicator of nutrient-poor wetland ecosites.

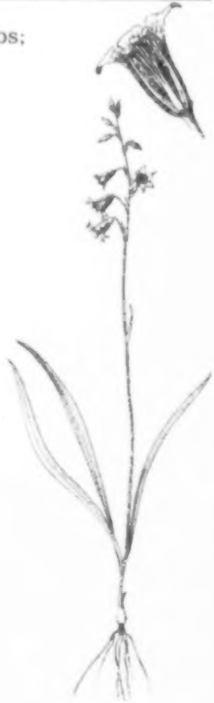
Forage Value: Poor to fair, moderately palatable but producing relatively little herbage.

Grazing Response: An increaser.

Notes: Both specific and common names allude to the typical arrangement of leaves; a seemingly inconsequential species, *S. trifolia* nevertheless plays a role in creating a healthy bog environment, well adapted to saturated and acidic conditions, and although not especially aggressive, will re-establish and spread following disturbance on these sites.

STENANTHIUM A. Gray - Bronze-bells

Stenanthium occidentale A. Gray - Bronze-bells



Growth Habit:	Glabrous perennials from small, elongated bulbs; stems rather weak, slender, 2-5 dm. tall.
Blades:	**Leaves few, more or less basal, linear-oblanceolate and narrowed at both ends, 15-30 cm. long**; upper 1-2 leaves reduced and bract-like.
Inflorescence:	Racemes simple to somewhat branched below, 6-25 flowered; pedicels erect-ascending, the **flowers usually nodding, bronze to green-bronze, 10-15 mm. long**, narrowly cup-shaped; bracts scarious, the petals and sepals similar, narrowly lanceolate, **with reflexed tips**, often persistent-withering; stamens 6, included; ovary superior, with distinct, included styles; **capsules membranous, lanceolate, up to 2 cm. long, 3-beaked**; seeds flattened, 3-4 per cell.
Habitat & Distribution:	Confined to the southern Rocky Mountains where found in foothills, montane and subalpine situations. Grows in moist woods, along shaded banks, on wet cliffs.
Forage Value:	Poor, of little significance as a forage species.
Grazing Response:	Increasers.
Notes:	The generic name from the Greek *steno*, narrow, and *anthos*, flower, in reference to the narrow perianth segments; frequently encountered along montane trails but never abundant, bronze-bells can be appreciated for their rather obscure but delicate and pleasantly-scented flowers.

TOFIELDIA Huds. - False Asphodel

Common Characteristics

- Perennials with short rhizomes.
- Blades linear, mostly basal.
- Blades somewhat 2-ranked, with their edges turned toward the stems.
- Stems scape-like, usually with 1-3 reduced, sheathing leaves.
- Flowers small, green-white, in dense racemes or spikes.
- Perianth segments alike, distinct, without glands, oblong-obovate.
- Stamens 6, hypogynous.
- Ovary 3-loculed and many-ovuled, with 3 short, distinct oval-shaped styles.
- Fruit a membranous, style-tipped capsule, subtended by a persistent perianth.
- Seeds numerous.

Key to Tofieldia

1. Plants glabrous; pedicels arising singly, without bractlets below flowers; seeds without appendages. *T. pusilla*

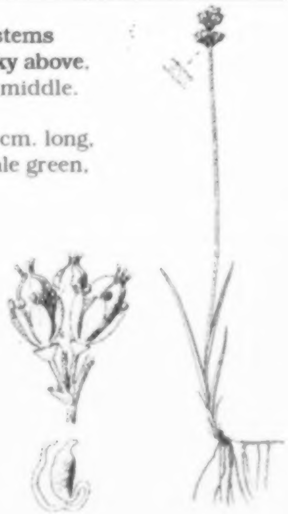
Plants sticky-glandular; pedicels in 2's or 3's, each with 3 small bractlets below flowers; seeds with appendages. *T. glutinosa*

Tofieldia glutinosa (Michx.) Pers. ssp. ***glutinosa*** - Sticky Asphodel

Growth Habit: Short rhizomatous plants 1-5 dm. tall; **stems usually glandular-pubescent below, sticky above**, often with 1-3 bract-like leaves near the middle.

Blades: Leaves **several, broadly linear** and 6-20 cm. long, **iris-like, with edges toward the stem**, pale green, **mostly basal**.

Inflorescence: Racemes 2-5 cm. long and 1-2 cm. thick, of whitish, fascicled flowers; **pedicels sticky, 2 or 3 together**, each with three small connate bracts below flowers; **perianth segments greenish-white, about 4 mm. long**; capsules ovoid, 5-6 mm. long, **yellow to red-purple; seeds with a contorted appendage at each end**.



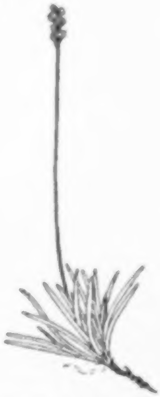
Similar Species:

1. ***Tofieldia pusilla*** (Michx.) Pers. - Bog Asphodel

More restricted in its range, found in western regions. Grows in calcareous marshes, on wet banks and shores, on moist ledges, sometimes at high elevations.

Differs as follows:

- Smaller, more slender plants 0.5-2 dm. tall.
- Plants not glutinous or pubescent.
- Leaves more numerous but shorter (2-5 cm. long), basal.
- Pedicels solitary, without bracts below flowers.
- Flowers smaller (about 2 mm. long).
- Seeds without appendages.



Habitat & Distribution:

Fairly common in the foothills and Rocky Mountain region, with a few sporadic occurrences northward. Grows on wet calcareous ledges and banks, marshy ground, on shores; *Tofieldia* species are indicators of wet calcareous ecosites.

Forage Value:

Poor, little used by livestock and wildlife under normal conditions.

Grazing Response:

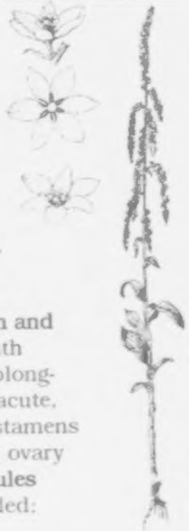
Increasers.

Notes:

The generic name in honor of the British botanist Thomas Tofield, 1730-1799; *glutinosa* describes well the sticky, glandular stems; asphodel was a flower of classical legend that covered the Elysian Fields, these species immortal in nature and part of the blissful afterlife; unlike the original mythological plants, our *Tofieldia* species are not especially attractive, but do play a role as vegetation cover in boggy places, valued for their tolerance of moist, moderately calcareous sites.

VERATRUM L. - False Hellebore

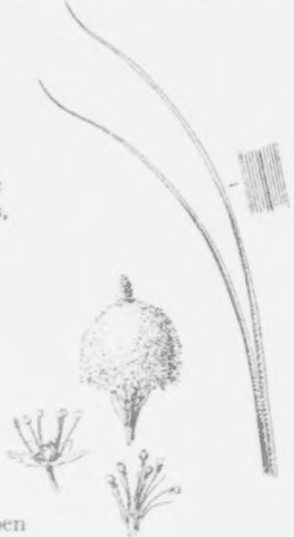
Veratrum eschscholtzii (R. & S.) A. Gray - False Hellebore



Growth Habit:	**Tall, coarse plants** from thick erect rhizomes, **1-2 m. high; stems stout**, ridged, mostly glabrous below but softly hairy above and in inflorescence.
Blades:	**Leaves distributed along stem, the lowest broader and larger (1-2 dm. long), ovate-elliptic**, acute, **sessile and often clasping; blades strongly veined and plaited**, dark green above, paler below, finely hairy, at least below.
Inflorescence:	**Panicles many-flowered**, 3-7 dm. long, rather **open and diffuse, with spreading**, elongate branches; perianth segments similar, **8-10 mm. long, yellow-green**, oblong-oblanceolate, narrowed below to a claw, the apex acute, often ciliate-serrulate, somewhat woolly outside; stamens 6, opposite (and shorter than) perianth segments; ovary glabrous, 3-lobed, with three distinct styles; **capsules tawny to brown, ovoid, 2-2.5 cm. long**, many-seeded; **seeds large (8-10 mm. long), flattened, winged**.
Habitat & Distribution:	Grows in foothills and montane areas, primarily in the southern Rocky Mountains. Found in moist thickets and meadows, on lush slopes, in swampy places. Usually an indicator of medium-rich sites.
Forage Value:	Poor, poisonous due to the presence of steroid alkaloids; the entire plant is toxic, roots rated as 1-10 times as potent as the foliage; fortunately, as with most of our poisonous species, livestock will avoid the plants under normal conditions, ingestion most likely to occur on overgrazed range, in areas of livestock concentration, and in early spring; symptoms of poisoning include salivation, nausea, muscular weakness, general paralysis and spasms, a slow, then rapid pulse; death results from asphyxia.
Grazing Response:	An increaser.
Notes:	From the Latin *vere*, true and *ater*, black, in reference to the black roots; closely related to, or sometimes considered a variety of *V. viride*; despite its toxic properties, internal uses of the plant were at one time surprisingly numerous, roots chewed for toothaches, decoctions taken for indigestion, rheumatism, gout, and supposedly used to cause permanent sterility in both men and women; in contrast to its acclaimed benefits, roots were ingested by some native tribes for suicide, also used as an insecticide and to kill small rodents; externally, hellebore is said to cure headaches, act as a decongestant, and get rid of head lice; in spite of its rather unspectacular flowers, hellebore has attractive foliage and is a candidate for use in cool, moist gardens.

XEROPHYLLUM Michx.

Xerophyllum tenax (Pursh) Nutt. - Bear Grass

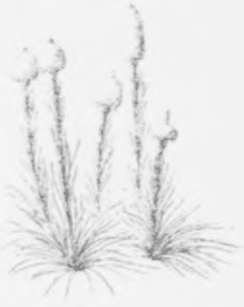


Growth Habit: **Coarse plants 1-2 m. tall**, from a stout, short rhizome; stems (flower stalks) stout.

Blades: **Cauline leaves rather numerous**, reduced above; **basal blades longer, often in large clumps; blades linear, the longest 2-4 dm. long, rough on margins, tough and wiry**.

Inflorescence: **Flower stems with dense, elongate racemes of numerous, small creamy-white flowers**; perianth segments 6-9 mm. long, spreading, stamens often exserted, styles very short; capsules 5-7 mm. long, 3-lobed, with 2-6 seeds per locule.

Habitat & Distribution: Confined to the southern Rocky Mountains where often abundant on open slopes, in dry open woods and clearings. Tolerant of subxeric, rather poor sites.



Forage Value: Poor, palatability generally inferior to that of many associated species; the young, most succulent foliage is occasionally eaten by wild ungulates and bear, elk in particular apparently fond of the flower stalks; utilization of mature foliage is limited, although in some cases grazed by goats.

Grazing Response: An increaser under most conditions, but rather poor reproductive capacity will result in declining populations in cases where utilization is heavy.

Notes: From the Greek *xeros*, dry, and *phyllon*, leaf, alluding to the dry, tough foliage; the plants have been variously used, the roots made into soap, also can be boiled or roasted for food, and root poultices applied to wounds to stop bleeding; the long, fibrous leaves were used as padding and in weaving; bear grass is no doubt one of our most spectacular mountain species when in bloom, but a disappointment in cultivated situations as plants normally flower every 5-7 years, and the seed stalks and the surrounding leaves die after flowering is complete; the spike-like leaves are sometimes used as a herbaceous addition to flower arrangements.

ZIGADENUS Michx. - Death Camas

Common Characteristics

- Plants from bulbs.
- Leaves narrow, borne near the base of stems, hairless.
- Leaf surfaces (not edges) facing stems.
- Flowers in terminal racemes, white to pale yellowish.
- Perianth segments 6, similar, each with a gland at the base.
- Ovary superior or partly inferior.
- Fruit a 3-lobed, many seeded capsule.

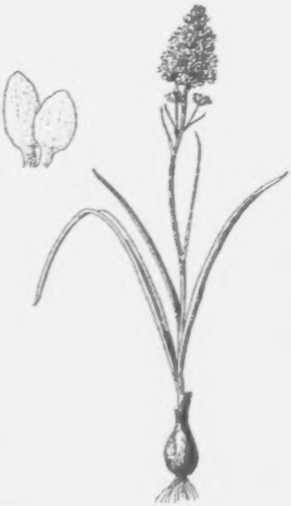
Key to Zigadenus

1. Foliage yellow-green; ovary superior; flowers 4-5 mm. long; perianth glands semicircular-obovate. *Z. venenosus*

Foliage blue-green; ovary partly inferior; flowers 7-10 mm. long; perianth glands inverted-heart-shaped. *Z. elegans*

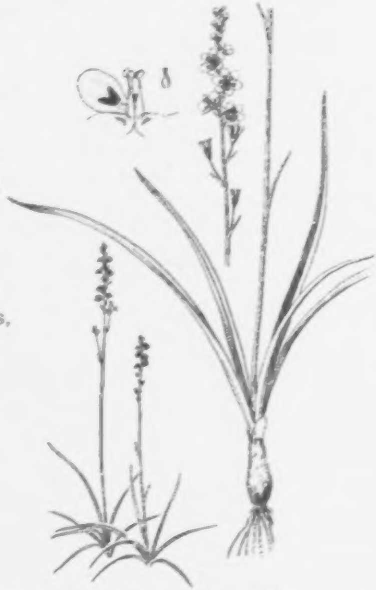
Zigadenus venenosus S. Wats. var. *gramineus* (Rydb.)Walsh - Death Camas

Growth Habit:	Plants from **ovoid bulbs**, these often deep, 6-15 cm. below the soil surface, **outer coats with parallel fibers**; stems 2-5 dm. tall, hairless.
Blades:	**Linear**, 2-3 mm. wide, 1-3 dm. long, keeled, narrowed to a blunt to pointed tip, **green to yellow-green**, not glaucous.
Inflorescence:	Inflorescence an **ovoid raceme, elongating in fruit** to 1.5 dm. long, **many-flowered**; bracts almost entirely pale with heavier veins; perianth **creamy white to pale yellow, 4-5 mm. long**, the basal glands yellowish-green, often inconspicuous, obovate to semicircular; ovary **superior**; capsules 8-15 mm. long, oblong-oval.



Similar Species:

1. ***Zigadenus elegans*** Pursh - White Camas
   Common in foothills and montane grassland, also in parkland regions. Present in a few locations in the prairies, absent from northern regions. Grows in moist grassland, sometimes in depressional saline meadows, in open woods and on rocky subxeric montane slopes; in driest regions restricted to ravines, snow melt areas, depressional grassland.
   Differs as follows:
   - Blades pale-glaucous.
   - Flowers fewer (3-several), 7-10 mm. long, greenish-white.
   - Ovary partly inferior.



Habitat & Distribution:

Found in the south where common. Grows in foothills grassland, on exposed montane sites, in open prairie grassland, in depressional areas and moist draws in very dry regions.

Forage Value:

Poor, the entire plant (especially the roots) containing toxic steroid alkaloids which act on the central nervous system causing an irregular heart beat and slower respiration; most fatalities occur in sheep, but all classes of livestock can be affected; poisoning occurs primarily in the spring, both because death camas greens-up before many associated species, and because soil is moist, and bulbs are easily pulled up; management practices should include the maintenance of pastures in good condition, and saving heavily infested areas for late-season use. *Note:* White camas (*Z. elegans*), contains the same poisonous principle, but in much lower concentration, and is seldom troublesome under normal conditions.

Grazing Response:

Increasers.

Notes:

Syn. *Z. gramineus*; *Zigadenus*, from the Greek *zugon*, yoke and *aden*, gland, referring to the paired gland of the type species; *venenosus*, a reference to poison; also toxic to humans, the bulbs sometimes caused poisoning in native people mistaking them for other edible members of the lily family; mashed bulbs of death camas were used as a poultice for bruises and rheumatism; it must be noted, however, that use of this or any other highly poisonous species, even for external purposes, is questionable.

IRIDACEAE - Iris Family

Common Characteristics

- Leaves 2-ranked, with edges facing stems (equitant).
- Flowers regular, perfect, with 6 perianth segments in 2 groups of 3.
- Stamens 3.
- Ovary inferior, 3-loculed, style 3-divided.
- Fruit a many-seeded capsule.

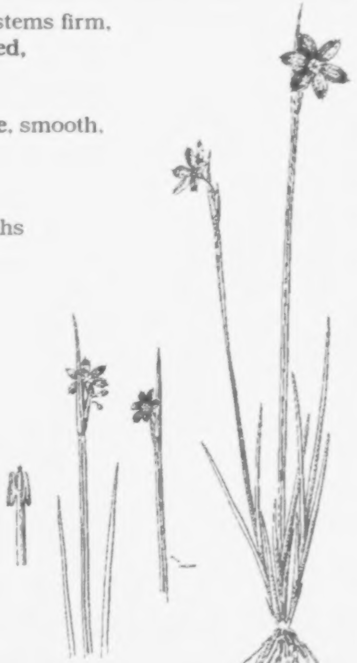
SISYRINCHIUM L. - Blue-eyed Grass

Common Characteristics

- Slender plants with flattened, two-edged stems.
- Leaves 1-4 mm. wide.
- Flowers 8-10 mm. long, the perianth with apex retuse or bristle-tipped, subtended by a pair of spathes (bracts).
- Filaments united until near apex.
- Styles with slender, linear branches.
- Capsules opening at apex, globose.

Sisyrinchium montanum Greene - Blue-eyed Grass

Growth Habit:	Plants with fibrous roots, tufted; stems firm, **conspicuously flattened and winged, 1-4 mm. wide**, 1-5 dm. tall.
Blades:	**1-4 mm. wide**, elongate, **grass-like**, smooth, **green to blue-green**, basal.
Sheaths:	Open, tawny to pale brown with scarious margins, veiny, old sheaths prominently shredding.
Inflorescence:	Flowers several, their pedicels usually longer than lowest bract; bracts (spathes) **somewhat inflated, often purple-tinged**, the outer about twice as long as the inner; **flowers blue-purplish, 10 mm. long**, the perianth distinctly **emarginate or abruptly narrowed to a bristle-tipped apex**; capsules 3-6 mm. high.
Habitat & Distribution:	Common throughout most ecoregions. Found in open grassland in foothills and northern regions, restricted to depressional grassland and moist meadows in drier prairies.



Forage Value: Poor, grazed only in the absence of better quality species, but overall producing little forage, also possibly mildly toxic as are the related iris species, although no cases of poisoning have been documented.

Grazing Response: Increasers, and strong populations sometimes an indication of overgrazing; the tough root systems enable plants to withstand fairly heavy trampling, with a tendency to spread as climax decreaser species decline.

Notes: The generic name was first used by Theophrastus to describe a related plant; *Sisyrinchium* species were apparently of little use to native people, but the related irises are listed as alterative, diuretic and purgative; roots of iris species are toxic, at one time used as arrow poison by some tribes; our blue-eyed grass, although not comparable to the spectacular iris, can make attractive additions to flower gardens; the flowers, however, can be disappointing when cut as they open only in full sunlight; environmentally, blue-eyed grass is an excellent early successional species, often naturally moving onto disturbances, and is adapted to a wide range of soil and moisture regimes.

ORCHIDACEAE - Orchid Family

Common Characteristics

- Perennial herbs from rootstocks, corms, bulbs, or fleshy and enlarged root clusters.
- Leaves simple, sheathing, entire, or lacking chlorophyll and reduced in a few saprophitic species.
- Flowers solitary or in spikes or racemes, perfect, epigynous, strongly irregular.
- Sepals green to colored, usually distinctly unlike the petals.
- Petals three, white to colored, often showy.
- Middle petal (lip) often very unlike the lateral ones, sometimes spurred at the base or sac-like, containing substances attractive to insects and hummingbirds.
- Stamens 1-2, united with the style into a central column.
- Pollen sacs two, the pollen often coherent in granular or waxy masses (pollinia).
- Style often terminating in a beak (rostellum), the stigmas (3) appearing as a viscid surface beneath the rostellum or in a cavity between the anther sacs.
- Ovary inferior, usually elongate-twisted as a result of the 1/2 turn rotation of the ovary during flower development.
- Ovary 1-loculed, the ovules numerous.
- Fruit a 3-valved capsule with many minute seeds.

Key to Orchidaceae

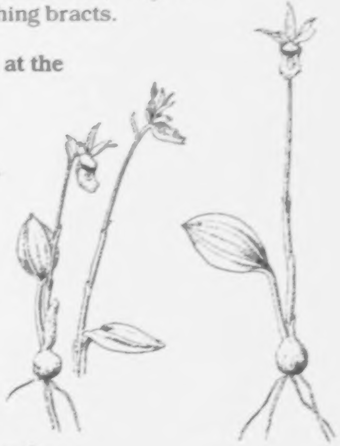
1.	Lip conspicuously enlarged and sac-like.	2
	Lip not enlarged and sac-like.	3
2.	Leaf solitary, basal.	*Calypso*
	Leaves more than one.	*Cypripedium*
3.	Plants not green; saprophitic, leaves scale-like.	*Corallorhiza*
	Plants green; not saprophitic, leaves well developed.	4
4.	Flowers with a conspicuous spur.	5
	Flowers lacking spur.	6
5.	Flowers white to yellowish-green, not spotted.	*Habenaria*
	Petals and lip pink and purple spotted.	*Orchis*
6.	Leaves 2, opposite, positioned near the middle of the stem.	*Listera*
	Leaves either cauline and alternate or basal.	7
7.	Leaves green, not in a rosette, lip fiddle-shaped; flowers fragrant, white.	*Spiranthes*
	Leaves often white-blotched, forming rosettes; lip saccate (but not inflated).	*Goodyera*

CALYPSO Salisb. - Venus-slipper

Calypso bulbosa (L.) Oakes - Venus-slipper

Growth Habit: Low perennial herbs from a **solid ovoid bulb**, scapes 5-20 cm. tall, with 2-3 small sheathing bracts.

Blades: Blade **glabrous, solitary, produced at the top of the corm in the fall and persisting through the winter, withering in the summer; leaves round-ovate, long-stalked, 2-4 cm. long**, acute at the apex, rounded-subcordate at the base.



Inflorescence: Flowers **solitary (rarely 2)**, showy, the sepals and lateral petals alike, 10-20 mm. long, lanceolate, ascending over the lip, **pale purple and each with three deeper purple veins; lip inflated and sac-like**, 15-20 mm. long, **yellow to purplish, conspicuously**

purple spotted and streaked, yellow-pubescent within; pollinia two per sac, united, all sessile on a broad gland; capsules about 1 cm. long.

Habitat & Distribution:	Most common in the southern Rocky Mountains, in central regions and in the Cypress Hills. Also found less frequently northward. Grows in moist, cool, shaded coniferous forests in soil rich with decaying leaves and wood.
Forage Value:	Poor.
Grazing Response:	A decreaser in heavily used areas, sensitive to even moderate disturbance that will dislodge the bulbs; one of our more prolific orchids, populations remaining healthy and stable in many woodlands that are typically rather sparingly grazed.
Notes:	Named for the goddess Calypso, the daughter of Atlantis, the term translating concealment, as the species is frequently hidden, also seasonally undetectable on the mossy forest floor; *bulbosa*, an obvious reference to the plant base; a unique characteristic of the genus is the emergence of a solitary leaf in late summer, this persisting through winter, then withering after flowering, the species then obscure and often overlooked for the remainder of the season; as with most orchids, calypso is best left undisturbed in its native habitat, efforts to transplant or otherwise propagate it usually unsuccessful and serving only to threaten the survival of populations.

CORALLORHIZA Chatelain - Coral-root

Common Characteristics

- Plants from coral-like rhizomes, these with short, thick branches; true roots absent.
- Stems scape-like, with sheathing scales (reduced, non-green leaves).
- Plants saprophitic, lacking chlorophyll.
- Flowers in a spike-like raceme.
- Sepals nearly equal, the lateral two united at the base, often forming a short spur.
- Lateral petals similar to but shorter than sepals.
- Lip with small lateral lobes or undulate, joined to the base of the flattened column, terminal, deciduous.
- Column curved above lip, the anther terminal, deciduous.
- Pollinia 4.
- Capsules reflexed.

Key to Corallorhiza

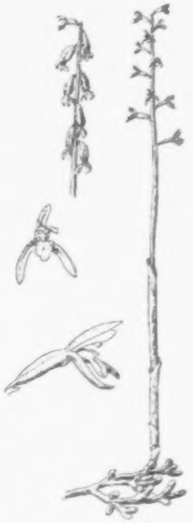
1. Stems very slender, yellowish, perianth segments 1-nerved, yellowish; lip 4-5 mm. long. *C. trifida*

Stems purplish, more stout (over 2 mm. broad); perianth segments each 3-nerved, purple-tinged. 2

2. Lip without lobes, purple-striped; true spur none; petals mostly more than 9 mm. long. *C. striata*

Lip with 2 lobes, white and purple spotted; spur well developed; petals to 9 mm. long. *C. maculata*

Corallorhiza trifida Chatelain - Pale Coral-root



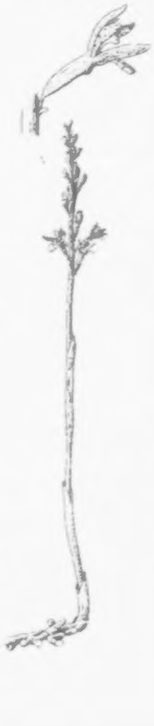
Growth Habit: Rhizomes coral-like, producing **pale yellow to pale greenish-yellow stems**, 1-3 dm. tall, **these slender (less than 3 mm. wide)**.

Blades: **Reduced to pale, sheathing bracts along the stems.**

Inflorescence: Racemes 2-7 cm. long, 3-15 flowered, the flowers spreading on rather stout pedicels; sepals and lateral petal segments **1-nerved, yellowish/greenish-white** or rarely purple-tinged; spur reduced to a slight protuberance; **lip 4-5 mm. long, white**, sometimes purple-dotted, oblong, usually with two small teeth near the base and two short ridges on the face, 3-nerved; column rather broad; capsules about 1 cm. long.

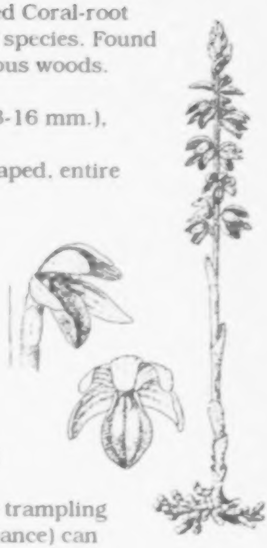
Similar Species:

1. ***Corallorhiza maculata*** Raf. - Spotted Coral-root
   Rather uncommon, found in the southern Rocky Mountains, and central regions, Cypress Hills. Grows in rich, moist to dry coniferous or mixed woods.
   Differs as follows:
   - Stems taller (2-5 dm.), stouter, and deeper colored (purple to yellow-brown).
   - Racemes longer (5-20 cm.) and with more flowers (10-40).
   - Sepals and lateral petals longer (6-9 mm.), each with three conspicuous purple stripes, the spur conspicuous.
   - Lip 6-10 mm. long, white, purple-spotted, with two lateral lobes.
   - Albino forms, with white, unspotted lip, also occasional.



2. ***Corallorhiza striata*** Lindl. - Striped Coral-root
Very similar in range to the preceding species. Found in rich, moist, coniferous and deciduous woods. Differs as follows:

- Sepals and lateral petals longer (8-16 mm.), the stripes more conspicuous.
- Lip longer (8-12 mm.), tongue-shaped, entire to undulate, without lobes.
- Lip white, purple-striped.
- Spur none.



Habitat & Distribution: Common except in the prairies. Grows in moist woods and thickets, in bogs.

Forage Value: Poor.

Grazing Response: Decreasers, *C. trifida* the most successful competitor of the three species; seldom impacted directly by grazing but excessive trampling (more often caused by mechanical disturbance) can interfere with the sensitive saprophitic root which feeds on decayed organic matter, also can disrupt the seed-mycelia interactions.

Notes: The generic name, from the Greek *korallion*, coral, *riza*, meaning root, in reference to root characteristics; *trifida* alludes to the 3-lobed lip; pale coral-root appears to be the most hardy of the three species, although certainly the least attractive; like other orchids, *Corallorhiza* is remarkably adapted for cross-pollination by insects: the stamen/style column is curved, with 2 pollen masses (pollinia), pollen adhering to visiting insects which, in turn, land on the lip of the next flower, thereby causing the lip to move and expose the stigma.

CYPRIPEDIUM L. - Lady's-slipper; Moccasin-flower

Common Characteristics

- Perennials with short to elongated rhizomes and thickened coarse roots.
- Stems usually leafy, pubescent, often glandular.
- Blades two or more, alternate, large, broad, plaited, sessile and sheathing at the base.
- Flowers 1-3, large, showy.
- Sepals somewhat unlike lateral petals, the lower two united under the lip.
- Lip inflated, pouch-like, the margins somewhat inrolled.
- Column bent over lip opening, with two fertile stamens and a thick, petaloid staminode.
- Stigma broad, slightly 3-lobed, the lateral lobes somewhat covering fertile anthers.
- Pollinia granular.
- Rostellum absent.

Key to Cypripedium

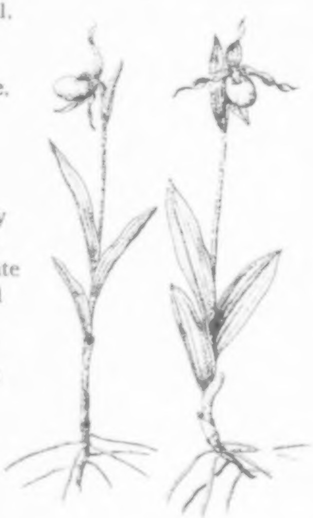
1. Sepals oval-obovate, not longer than lip; lip 1-2 cm. long. *C. passerinum*

Sepals elongate-lanceolate, mostly longer than lip; lip 2-4 cm. long 2

2. Flowers brownish, lip white; rare in the southern Rocky Mountains. *C. montanum*

Flowers yellow; common and widespread. *C. calceolus*

Cypripedium calceolus L. - Yellow Lady's-slipper



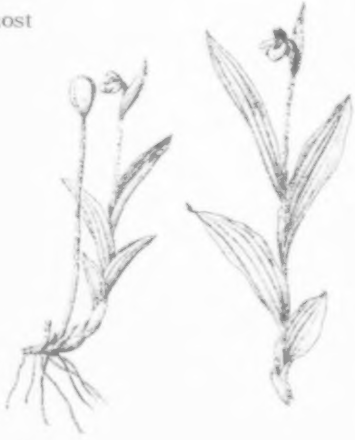
Growth Habit: Root thick, coarse, stems 1-4 dm. tall, pubescent and often glandular.

Blades: Leaves **3-4 per stem, ovate-lanceolate,** 5-15 cm. long, slightly sheathing, **somewhat glandular-pubescent on both surfaces.**

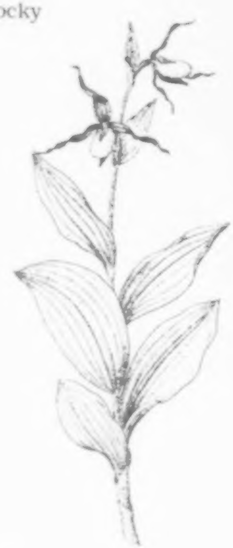
Inflorescence: Flowers **mostly solitary,** subtended by a leafy bract; **sepals ovate-lanceolate, 3-5 cm. long,** pointed, usually undulate and spirally twisted, green-yellow and purple-brown mottled; lateral petals similar but narrower and somewhat longer (to 6 cm.); **lip yellow and often purple dotted around opening, sac-like, 1.5-4 cm. long;** staminode triangular, yellow and purple-dotted.

Similar Species:

1. ***Cypripedium passerinum*** Richards. - Lady's-slipper; Sparrow's-egg
   Scattered throughout, with most occurrences in montane, foothills and central boreal regions. Grows in moist, coniferous woods, in mossy, springy places, along shaded streams, usually in calcareous soils. Differs as follows:
   - Flowers usually 2.
   - Sepals oval-obovate, not longer than the lip (1-1.5 cm. long).
   - Lip about 1.5 cm. long, obovate, white to pale pink, purple-spotted inside (hence, "sparrow's-egg" appearance).



2. ***Cypripedium montanum*** Dougl. *ex* Lindl. - Mountain Lady's-slipper
Very rare in the foothills and southern Rocky Mountains. Grows in moist woods.
Differs as follows:
- Leaves more numerous (4-6 per stem) and slightly larger (5-16 cm. long).
- Flowers 1-3, sepals and lateral petals similar in shape and size to those of *C. calceolus*.
- Lip 2-3 cm. long, white, tinged and veined with purple.
- Staminode oblong-ovate.



Habitat & Distribution: Most common in foothills and parkland regions. Also a few reported occurrences northward. Grows in moist, rich, mixed and deciduous woods, in calcareous bogs, in damp, mossy woods. Quickly disappearing from many regions due to the loss of habitat through clearing and cultivation, and excessive and sometimes unnecessary spraying of roadsides.

Forage Value: Poor.

Grazing Response: *C. calceolus* an increaser #1, other members of the genus classed as decreasers.

Notes: From the Greek *kypris*, Venus, and *pes*, foot, this as well as specific and common names referring to the shape of the lip; typical of its genus, *C. calceolus* produces an abundance of seed, but this is dependent upon the mycelia of certain fungi for survival; the mycelia must penetrate the seed coat and convert starches into sugars in order to be usable by the embryo; for this reason, orchids cannot be propagated by seed unless this seed-mycelia relationship can be simulated artificially; perhaps more than any other member of the family, *C. calceolus* appears to be the easiest to transplant provided large amounts of soil are taken; several populations have been successfully relocated due to proposed disturbance of their original habitat; known particularly as a roadside species, the yellow lady's-slipper is thriving in many areas, at times appearing resistant to broad-leaf herbicides used to control shrubby growth, and in other cases severely damaged by these practices.

GOODYERA R. Br. - Rattlesnake Plantain

Common Characteristics

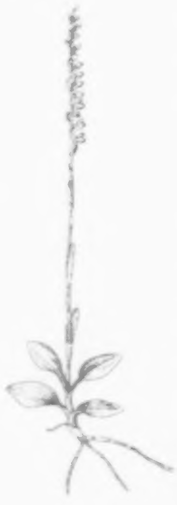
- Scapose plants with creeping rootstocks and thick roots.
- Leaves in basal clusters/rosettes, deep green and often white-reticulate or blotched.
- Scapes erect, with several scale-like bracts.
- Racemes spike-like, with white-greenish glandular-pubescent flowers.
- Upper sepals and lateral petals joined to form a hood over the lip.
- Lateral sepals free, the tips somewhat spreading.
- Lips saccate to concave, entire, prolonged into a reflexed beak.
- Spur absent.
- Column rather short, the rostellum elongate, 2-pronged.
- Pollinia 2, granular.
- Capsules erect.

Key to Goodyera

1.	Leaves 1-3 cm. long; racemes 3-6 cm. long; lip distinctly saccate, its margins flaring-recurved.	*G. repens*
	Leaves 3-6 cm. long; racemes 6-10 cm. long; lip not saccate, its margins incurved.	*G. oblongifolia*

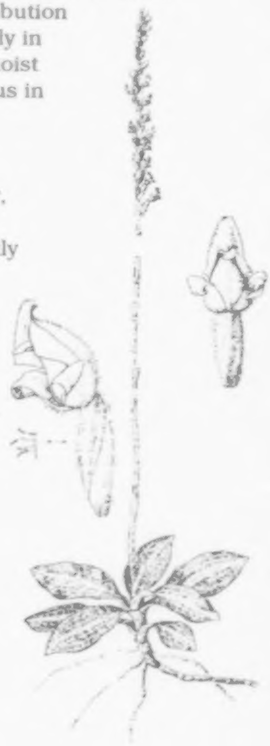
Goodyera repens (L.) R. Br. var. ***repens*** - Dwarf Rattlesnake Plantain

Growth Habit:	Plants with extensive rhizomes, **scapes slender, with several sheathing, sometimes greenish bracts, 1-2 dm. tall,** glandular-pubescent, at least above.
Blades:	**Leaves broadly ovate-oblong, 1-3 cm. long, basal or nearly so, but not strongly roseate; blades green, also often white-reticulate.**
Inflorescence:	**Racemes 3-6 cm. long, one-sided, the perianth 3-5 mm. long, white-greenish** or pink-tinged, glandular pubescent; hood strongly concave; **lip deeply saccate, the margins recurved-flaring;** anther tip retuse to pointed; capsules mostly less than 1 cm. long.



Similar Species:

1. ***Goodyera oblongifolia*** Raf. - Rattlesnake Plantain
A species with much the same distribution but generally less common, especially in northern regions. Found in dry to moist coniferous forests, growing on humus in mossy places.
Differs as follows:
    - Rhizomes shorter.
    - Larger plants, the culms stouter, 1-4 dm. tall.
    - Blades 3-6 cm. long, more strictly forming basal rosettes.
    - Raceme larger (3-6 cm. long), 1-sided to spiral.
    - Perianth larger (6-9 mm. long).
    - Lip swollen but scarcely saccate, the margins incurved.
    - Anther tips long-pointed.



Habitat & Distribution: Frequent, found in the foothills, montane and boreal forest regions. Grows in dry to moist, mixed and coniferous woods, in shaded, mossy places.

Forage Value: Poor.

Grazing Response: Decreasers; although sensitive to disturbance and trampling, *Goodyera* species typically grow in rather peripheral areas in terms of ungulate utilization, the exception being cover sites in close proximity to primary habitat.

Notes: The generic name is in honor of John Goodyer (1592-1664), an English botanist; the common name is derived from the resemblance of *G. oblongifolia* to rattlesnake skins, and as folklore goes, poultices made from the foliage were supposedly effective in treating snake bites; although members of the genus have rather unspectacular flowers, the attractive foliage is a welcome addition in old growth forests where understory vegetation cover is sparse and lacking in diversity.

HABENARIA Willd. - Bog Orchid

Common Characteristics

- Plants from fleshy or thickened-tuberous roots.
- Foliage glabrous, the leaves mostly several, cauline (solitary and basal in one species).
- Flowers small, green or white, in terminal bracted spikes or racemes.

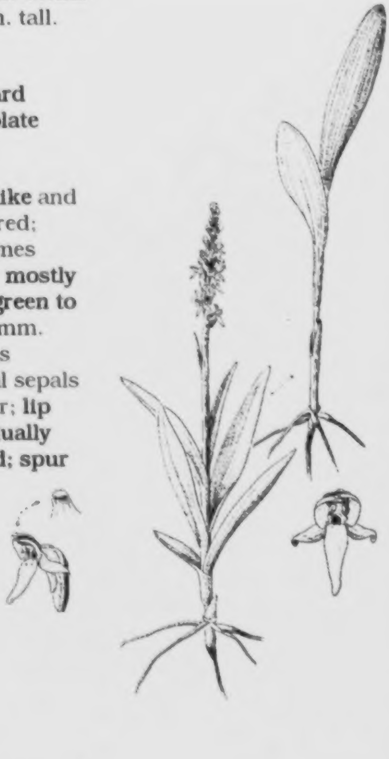
- Sepals and lateral petals more or less similar in form and color, or petals smaller.
- Perianth spreading or the petals erect and joined to the upper sepal.
- Lip entire to 3-lobed, linear to ovate-obovate, prolonged backward into a saccate or more elongate spur.
- Column rather short, the two pollen sacs separated by a broad connective, the pollen loosely aggregated to tightly massed into two pollinia.
- Stigmatic discs exposed, often widely separate.

Key to Habenaria

1.	Primary leaves 1-2, basal.	*H. obtusata*
	Primary leaves cauline (sometimes near base).	2
2.	Lip oblong, 2-3 toothed; spur inconspicuous, pouch-like.	*H. viridis*
	Lip entire.	3
3.	Flowers white, fragrant; lip dilated at base.	*H. dilatata*
	Flowers greenish; lip linear-lanceolate.	*H. hyperborea*

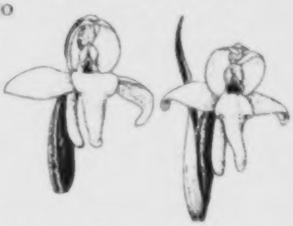
Habenaria hyperborea (L.) R. Br. - Northern Bog Orchid

Growth Habit:	Plants from thickened roots, the stems slender to rather stout, 1-7 dm. tall.
Blades:	**Leaves on lower stem largest** (2-10 cm. long), **reduced upward as bracts; blades linear-lanceolate to oblanceolate**.
Inflorescence:	Raceme **2-10 cm. long, spike-like** and rather densely 5-15 (20) flowered; lower bracts equal to or 2-3 times longer than flowers, the **upper mostly shorter than flowers; flowers green to yellow-green**; upper sepal 4-7 mm. long, blunt, it and lateral petals forming a distinct hood; lateral sepals 3-nerved, lanceolate and longer; **lip lanceolate**, 4-7 mm. long, **gradually broadened basally, not toothed; spur about as long as the lip**, slenderly clavate-cylindrical; column about 1/2 as long as upper sepal; pollen loosely aggregated into 1 pollinium per sac.

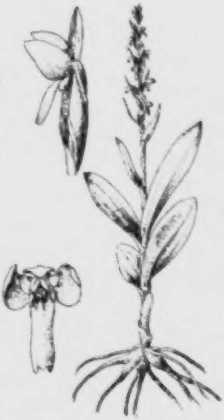


Similar Species:

1. ***Habenaria dilatata*** (Pursh) Hook. - Tall White Orchid
   Generally less common, restricted to southern boreal/Rocky Mountain regions. Found in wet meadows and bogs, in wet woods.
   Differs as follows:
   - Leaves larger, 4-20 cm. long.
   - Racemes longer (1-3 dm.), dense to lax.
   - Flowers spicy-fragrant, yellow-white to white/greenish.
   - Lip broadly lanceolate, distinctly widened-dilated at the base.



2. ***Habenaria viridis*** (L.) R. Br. var. ***bracteata*** (Muhl. Gray - Bracted Orchid
   Absent from some northern boreal regions and dry prairies in the south, otherwise common.
   Grows in much the same habitat as *H. hyperborea*.
   Differs as follows:
   - Blades larger (4-12 cm. long) and less reduced upward.
   - Inflorescence becoming more open at maturity, to 20 cm. long.
   - Bracts foliaceous, the lower up to 5 cm. long.
   - Lip truncate and 2-3 toothed at apex.
   - Spur shorter than the lip, saccate.



Habitat & Distribution:

One of our most common and widespread orchids, found in all regions except the dry prairie area. Grows in bogs, wet woods, moist meadows, often in calcareous soils.

Forage Value:

Poor; some reports indicate that *H. hyperborea* specifically makes fair quality forage, but it is doubtful that the genus as a whole is utilized to any extent by ungulates.

Grazing Response:

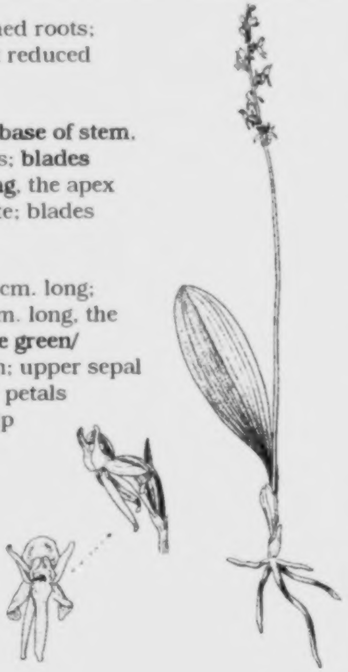
Increasers #1 (all three species); compared to many members of the family, they are successful competitors, often fairly abundant and populations usually remain strong under normal grazing systems.

Notes:

The generic name is derived from the Latin *habena*, rein or strap, alluding to the narrow lip characteristic of some species, both specific and common names a reference to northern distribution, *H. hyperborea* one of the few orchids found north of the Arctic circle; although small, *H. dilatata* is attractive, and is probably best known for its overpowering spicy-fragrant flowers.

Habenaria obtusata (Pursh) Richards. - Blunt-leaved Orchid

Growth Habit:	**Scapose plants** from fleshy-thickened roots; **stems 1-3 dm. tall**, with or without reduced bract-like leaves.
Blades:	**Leaves solitary (rarely two), at the base of stem**, often also with 1-2 sheathing bracts; **blades obovate-oblanceolate, 4-12 cm. long**, the apex rounded-blunt and the base cuneate; blades erect-ascending.
Inflorescence:	Racemes loosely few-flowered, 2-8 cm. long; lower bracts greenish and to 15 mm. long, the upper much reduced; **perianth pale green/ yellow**, or the lip and petals whitish; upper sepal rounded, broad; lateral sepals and petals lanceolate-oblong, **4-6 mm. long**; lip linear, deflexed with the tip somewhat upturned, 5-8 mm. long; **spur slender, tapering from the base, about as long as the lip**.
Habitat & Distribution:	Fairly common except in the prairie region in the south. Grows in moist woods, in mossy shaded places.
Forage Value:	Poor.
Grazing Response:	An increaser #1, considered to be relatively hardy under normal grazing systems, populations more often negatively impacted by mechanical disturbance than by ungulate activity.
Notes:	The specific and common names both rather unimaginative, referring to the blunt basal leaf; a large genus, globally boasting about 500 species.



LISTERA R. Br. - Twayblade

Common Characteristics

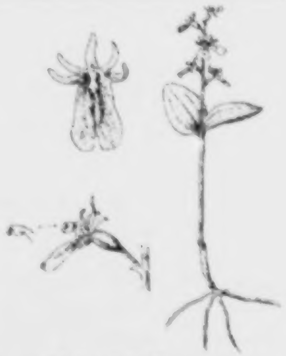
- Small woodland plants.
- Leaves 2, opposite, positioned near the middle of the stem.
- Flowers small, in slender, lax racemes.
- Flowers greenish, sometimes purplish, sepals and lateral petals similar, often reflexed.
- Lip drooping, longer than sepals, the apex notched to deeply cleft.
- Spur absent.

Key to Listera

1. Leaves ovate-elliptic, not cordate; lip oblong, with 2 auricles at base, notched at apex. *L. borealis*

Leaves deltoid-cordate, mucronate; lip linear-oblong, cleft about 1/2 way into slender lobes. *L. cordata*

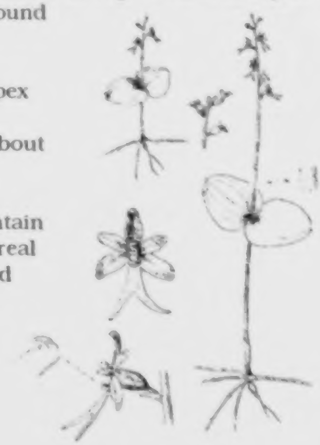
Listera borealis Morong - Northern Twayblade



Growth Habit: Slender plants from fibrous roots, **5-25 cm. tall**.

Blades: **Opposite, 2, at the middle of the stem, ovate-elliptic**, 1-5 cm. long.

Inflorescence: **Flowers pale yellowish-green**, with deeper green veins; sepals and lateral petals reflexed, linear-lanceolate, 4-7 mm. long; **lip broadest at base, oblong, 7-12 mm. long, notched at the apex, with auricles at the base**.



Similar Species:

1. ***Listera cordata*** (L.) R. Br. -Heart-leaved Twayblade
Frequent in the foothills/Rocky Mountain regions and at higher elevations in the boreal forest. Found in moist, often boggy woods.
Differs as follows:
    - Leaves cordate-based, the apex with a sharp point.
    - Lip linear-oblong and cleft about 1/2 way into narrow lobes.

Habitat & Distribution: Frequent in the foothills/Rocky Mountain regions, scattered throughout the boreal forest. Found in boggy, mossy wooded places, tolerant of cool, acidic soils.

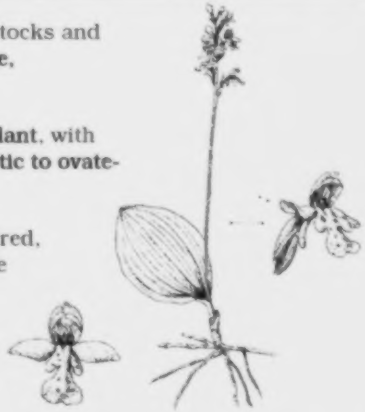
Forage Value: Poor.

Grazing Response: Decreasers (applied to both species), the fragmentation of habitat via mechanical disturbance more detrimental to populations than normal grazing systems.

Notes: The generic name in honor of M. Lister, 1638-1712, an English naturalist, *borealis* in reference to its northern distribution, ranging northward to Alaska; the genus has several rare members locally but both *L. cordata* and *L. borealis* are widely distributed, although seldom abundant; it has been noted that *L. cordata*, specifically, is rather well adapted for cross-fertilization: the beak of the stamen/style column expels a sticky substance when stimulated by touch, in doing so ensuring the adherence of pollen to insect pollinators.

ORCHIS L.

Orchis rotundifolia Banks *ex* Pursh - Round-leaved Orchid



Growth Habit: Plants from creeping, scaly rootstocks and thickened roots; **stems scape-like, 10-25 cm. tall**.

Blades: **Leaf solitary, at the base of the plant**, with 1-3 sheathing bracts; **leaves elliptic to ovate-obovate, 3-7 cm. long**.

Inflorescence: Racemes rather closely 2-8 flowered, with green to purplish bracts, the lowest to 2 cm. long; flowers 12-15 mm. long, the **upper sepal ovate-rounded, hood-like**; lower sepals narrower and slightly longer than the upper, 3-nerved; **lip white to pink and purple spotted, 3-lobed, the terminal lobe longer and notched; spur slender, curved, much shorter than the lip**; pollinia granular, ovary greenish to purplish.

Habitat & Distribution: Found throughout most regions (absent from drier prairie areas). Grows in moist, boggy woods, in shaded, springy and swampy places, usually in calcareous soils.

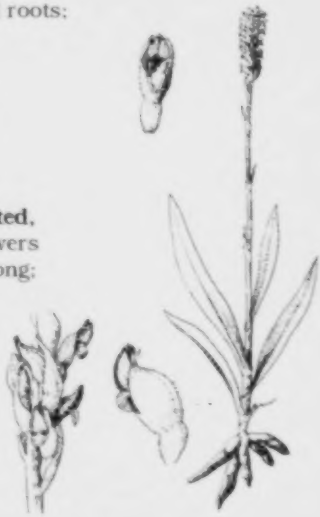
Forage Value: Poor.

Grazing Response: Decreasers, the plants very susceptible to mechanical disturbance which disconnects the roots from their hold in the soil, the results often fatal.

Notes: *Orchis*, a Greek term for the rounded-thickened roots, *rotundifolia* translating round-leaved; about 100 species world-wide, but only a few native to North America; *Orchis* is a small but very beautiful orchid, and although sometimes abundant locally, is not recommended for propagation due to both the specific seed-fungi interrelationships and sensitive root systems; as a result, survival rates from both transplanting and seeding can be expected to be poor.

SPIRANTHES L.C. Rich. - Ladies'-tresses

Spiranthes romanzoffiana Cham. & Schlecht. - Ladies'-tresses



Growth Habit:	Plants with enlarged, fleshy, fascicled roots; stems stout, 1-4 dm. tall.
Blades:	Leaves linear to oblong/lanceolate, 5-15 cm. long, the larger confined to lower stems, then **rather abruptly reduced** and bract-like above.
Inflorescence:	Flowers crowded in a **3-ranked, twisted, spike-like raceme** 3-15 cm. long; flowers **greenish-white, fragrant**, 6-10 mm. long; bracts from somewhat longer to shorter than flowers; flowers **tubular**, the sepals **viscid-pubescent**, the upper and lateral petals similar, ovate-lanceolate, connate, **forming a curved hood**; lower sepals often with reflexed tips; lip 9-12 mm. long, **strongly deflexed**, constricted beyond the middle and **widened into a rounded terminal lobe**, with **wavy margins; spur absent**; pollinia 2, each 2-cleft, split into thin plates of granular pollen connected by elastic threads.
Habitat & Distribution:	Rather common throughout, but absent from driest regions in the south. Grows in bogs and wet meadows, in moist clearings, sometimes in rather dry woods.
Forage Value:	Poor, seldom utilized under normal conditions.
Grazing Response:	An increaser #1.
Notes:	The generic name, from the Greek *speira*, coil, and *anthos*, flower, alluding to the twisted arrangement of flowers that resembles braided hair (and hence the common name); a pleasantly scented and delicately beautiful plant, ladies'-tresses is one of our more common orchids locally, this due, in part, to its rather wide range in distribution patterns and adaptations.

URTICACEAE - Nettle Family

Common Characteristics

- Monoecious or dioecious herbs (ours) with watery juice and stinging hairs.
- Blades opposite or alternate, mostly stipulate, simple.
- Flowers in cymose or spike-like (catkin-like) clusters.
- Flowers small, hypogynous.
- Petals absent, calyx 3-5 lobed, greenish.
- Stamens as many as calyx lobes and opposite them, strongly inflexed in bud.
- Pistil 1, with 1 carpel, superior, with 1 basal ovule.
- Fruit an achene or drupe.

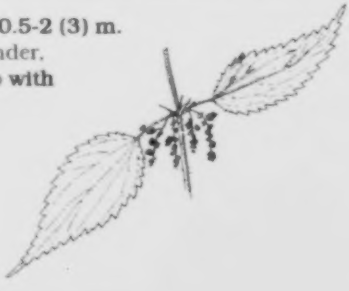
URTICA L. - Nettle

Common Characteristics

- Annuals or perennials with stinging hairs.
- Blades opposite, stipulate, 3-7 nerved, toothed.
- Plants monoecious or dioecious, in axillary paniculate cymes, these drooping.
- Staminate flowers with a deeply 4-cleft calyx, 4 stamens and a rudimentary pistil.
- Pistillate flowers with 4 sepals, the inner 2 enlarged at maturity, enclosing the fruit.
- Stigma sessile, tufted.
- Fruit a flattened achene, the seed often adherent to the pericarp.

Urtica dioica L. spp. ***gracilis*** (Ait.) Selander - Common Nettle

Growth Habit: Perennials from strong rhizomes, **0.5-2 (3) m. tall**, the stems sharply angled, slender, glabrous to bristly-pubescent, also **with stinging hairs**.



Blades: **Leaves opposite, ovate to narrowly lanceolate**, round-subcordate at the base, acuminate, rather **coarsely serrate**, glabrous on both surfaces or pubescent beneath, 5-15 cm. long; stipules prominent, the petioles up to 1/2 as long as blades.

Inflorescence: **Plants mostly monoecious, the staminate clusters as long or longer than petioles**, with a 4-lobed calyx and 4 stamens; **pistillate flowers above staminate, in smaller clusters**; perianth 1-2 mm. long, pubescent, about as long as achenes; achenes flattened, about 1.5 mm. long.

Habitat & Distribution: Well distributed throughout most regions. Grows from lowlands to montane elevations, found in moist, rich soil: in moist woods, on stream banks, on wooded montane slopes. Also abundant in disturbed areas (on roadsides, along trails, in logged areas, in waste places).

Forage Value: Poor to fair, probably nutritious but usually avoided by livestock, also has the potential to produce mild mechanical injury because of the presence of acetylcholine and histamine in the stinging hairs.

Grazing Response: An increaser, especially known as a species of disturbed and waste places, but not competitive in good condition rangeland.

Notes: From the Latin *uro*, to burn, an obvious reference to the stinging hairs, the specific name because the plants are dioecious; stinging nettle is known throughout the world as a nutritious species, high in vitamins A, C and D, also in iron, calcium, potassium, phosphorus, and sodium (cooking effective in destroying the stinging properties); medicinal uses were at one time numerous, the species listed as astringent, tonic, diuretic, antispasmodic, and known especially for its ability to stop internal bleeding; root decoctions were taken to treat diarrhea, dysentery and excessive phlegm, teas used to remedy various female problems; applications of fresh foliage were effective in numbing rheumatic pain and reducing bleeding; a number of tribes recognized the rather tough stems as useful in making cordage; environmentally, nettle is actually a beneficial species, quickly reclaiming disturbances, and, in doing so, discouraging the invasion of more troublesome weeds that are more competitive with better quality species as they begin to establish; nettles are the host plant to some of our familiar butterflies including the satyr anglewing (*Polygonia satyrus*) and red admiral (*Vanessa atlanta*), both of which hatch late in the season, overwinter as adults, and emerge in early spring.

SANTALACEAE - Sandalwood Family

Common Characteristics

- Rhizomatous hairless perennials, with roots enabling plants to become semi-parasitic.
- Leaves simple, entire, alternate.
- Flowers small, bronze-rose-tinged to greenish-white, in terminal or axillary clusters.
- Corolla none, sepals 5, united at base.
- Stamens 5.
- Ovary inferior.
- Fruit a 1-seeded drupe, the calyx persistent at top.

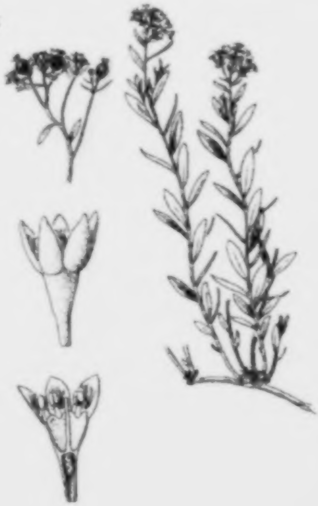
Key to Santalaceae

1. Leaves thin, oval, obtuse; flowers mostly 3, from axils of middle leaves, greenish-bronze; sepals triangular; fruit red, juicy. *Geocaulon*

Leaves firm, pale, linear-lanceolate, acute; flowers in terminal clusters, whitish-green; sepals longer than wide; fruit greenish, dry. *Comandra*

COMANDRA Nutt. - Bastard Toad-flax

Comandra umbellata (L.) Nutt. - Bastard Toad-flax



Growth Habit: **Rhizomes extensive**, shallow to deep; stems **clustered, 1.5-4 dm. tall**, often branched.

Blades: 1-10 mm. wide, 5-40 mm. long, **linear-lanceolate**, pointed, the **margins not toothed, with a thick white nerve**, slightly rolled, **pale green**.

Inflorescence: Flowers several, **in terminal clusters**; sepals **3-5 mm. long, green at the base, the lobes white, often purple-tinged**; sepals much longer than broad; fruit **spherical-ovoid**, narrow above, **greenish to brown, 4-10 mm. long, dry to slightly fleshy**.

Related Species: Two varieties:

1. Var. ***umbellata***
   - Leaves only slightly glaucous, thin, greenish, secondary veins evident.
   - Calyx lobes ovate-lanceolate, to 2.5 mm. long.
   - Fruit up to 6 mm. wide.
2. Var. ***pallida*** (DC.) M.E. Jones
   - Leaves pale-glaucous, thick and slightly fleshy, the secondary veins obscure.
   - Calyx lobes narrow, lanceolate, 3-4 mm. long.
   - Fruit up to 1 cm. in diameter.

Habitat & Distribution: Very common throughout all ecoregions. Grows in moist to dry areas, but usually on well drained soils: in sandy or gravelly areas, on roadsides, on exposed slopes, in prairie grassland, dry woods. Parasitic on a variety of species, thus wide ranging.

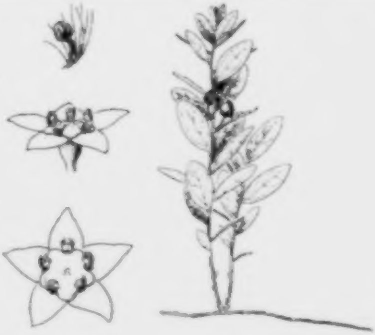
Forage Value: Poor, also a secondary selenium accumulator; fortunately, the foliage, although never particularly palatable, becomes less attractive when growing in seleniferous soils.

Grazing Response: An increaser.

Notes: Syn. C. *pallida*; from the Greek *kome*, hair, and *andros*, man, a reference to the hairy-based stamens; the name *pallida* means pale, alluding to the pale green foliage; called bastard toad-flax, as it is not true toad-flax (*Linaria vulgaris*); the berries are possibly edible, but are not considered palatable; C. *umbellata* frequently inhabits exposed, coarse soils and functions to a limited extent in stabilizing these sites.

GEOCAULON Fern. - Bastard Toad-flax; Northern Comandra

Geocaulon lividum (Richards.) Fern. - Bastard Toad-flax



Growth Habit: **Plants with spreading rhizomes**; stems solitary or several arising together, mostly simple, 1-2 (2.5) dm. tall, somewhat angled and furrowed, smooth.

Blades: **Ovate-oblong, 1.5-4 cm. long**, blunt, short-petioled, the lower reduced, upper well developed, green and **often yellow-mottled, thin, secondary veins prominent, reticulate**.

Inflorescence: **Flowers in small cymes in axils of upper or middle leaves, often in groups of 3**, all but 1 functionally staminate, sometimes early deciduous, the remaining flower perfect; sepals triangular, to 1.5 mm. long, greenish and bronze or purple-tinged; **fruit 5-9 mm. thick, nearly globose, red, fleshy**.

Habitat & Distribution: Common in all regions except the prairies and drier portions of the parkland. Found in a variety of habitats: sandy pine forests, moist coniferous forests, in bogs (especially associated with sphagnum).

Forage Value: Poor, plants both unproductive and unpalatable, also probably secondary selenium accumulators.

Grazing Response: An increaser.

Notes: The specific name, in Latin, translates bluish, a probable reference to the calyx color; as with *Comandra*, roots are parasitic on other plants; *Geocaulon* is a rather obscure plant of woodlands and bogs, the attractive berries possibly edible but unlikely very tasty.

POLYGONACEAE - Buckwheat Family

Common Characteristics

- Annuals or perennials, with simple leaves.
- Stipules (ocreae) cylindrical and sheathing the stem (sometimes absent).
- Flowers small, corolla none, calyx of separate sepals (4-6) or united, often enclosed by a cup-like involucre.
- Flowers perfect or imperfect.
- Stamens 3-9, styles 2-3.
- Fruit a lens shaped or 3-sided achene.

Key to Polygonaceae

1. Leaves mostly basal except whorls below flower umbels; stipules lacking; stamens 9. *Eriogonum*

Stem leaves present; flowers not in umbels; stamens fewer. 2

2. Sepals 6; fruit winged. *Rumex*

Sepals mostly 5; fruit not winged. *Polygonum*

ERIOGONUM Michx. - Umbrella-plant

Common Characteristics

- Leaves mostly basal except for a whorl below flowers in some species.
- Stipules (ocreae) absent.
- Flowers in characteristic umbel-like inflorescence, with an involucre of united bracts below.
- Sepals 6, stamens 9, styles 3.
- Calyx enclosing triangular achenes.

Key to Eriogonum

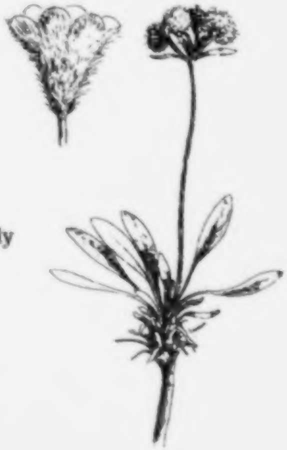
1. Plants annual, stems diffusely branched with slender branches; flower heads reflexed. *E. cernuum*

Plants perennial. 2

2. Leaves hairy above; bracts ascending; perianth hairy at the base; widespread in southern regions. *E. flavum*

Leaves glabrous above; bracts often reflexed; perianth glabrous; restricted to the southern Rocky Mountains. *E. umbellatum*

Eriogonum flavum Nutt. var. *flavum* - Yellow Umbrella-plant

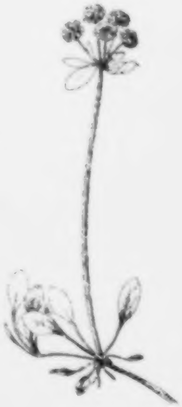


Growth Habit: **Tufted** perennials with **stout, thick, woody roots**; plant base branched; **stems naked, 1-3 dm. tall, densely hairy**, their bases often partially subterranean and clothed with old leaf bases.

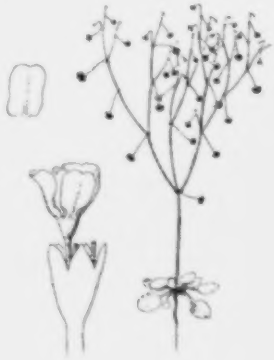
Blades: **Crowded at the base**, narrowly **oval-oblong**, 3-6 cm. long, **thick, densely woolly-hairy below, hairy but less densely so above**.

Inflorescence: **A compound umbel, with erect to spreading leaf-like bracts below;** involucres hairy, with 5 lobes; perianth **hairy**, at least basally, **4-6 mm. long, yellow to pink-tinged**; achenes hairy on upper half.

Similar Species:



1. ***Eriogonum umbellatum*** Torr. var. ***subalpinum*** (Greene) M.E. Jones - Umbrella-plant
   Restricted to the southern Rocky Mountains where found on exposed slopes and ridges from foothills to alpine elevations.
   Differs as follows:
   - Blades green and hairless above at maturity.
   - Bracts often reflexed.
   - Perianth hairless.



2. ***Eriogonum cernuum*** Nutt. - Nodding Umbrella-plant
   Occasional, sometimes locally abundant in the prairie region. Found in sandy soil, on sand hills, on badland slopes and eroded hillsides.
   Distinguished as follows:
   - Plants annual, 1-4 dm. tall.
   - Blades in a basal rosette, stalked, oval to orbicular, 1-2 cm. long, white-woolly below, less so above.
   - Inflorescence a diffusely branched raceme, the peduncles sharply reflexed.
   - Involucres single.
   - Flowers white to pinkish, about 2 mm. long.

Habitat & Distribution: Very common in the prairies and foothills/mountain regions. Absent from the parkland and boreal forest. Found in very dry prairie grassland, on eroded and dry hillsides, in badlands and exposed rocky places, sometimes at higher elevations.

Forage Value: Poor, umbrella-plants as a whole of little value to grazing animals, and providing small amounts of forage; flower heads are somewhat palatable, and are often clipped off, leaving the stiff foliage behind.

Grazing Response: An increaser, tolerant of drought and exposed sites and resistant to trampling, increasing when better quality range plants are grazed out.

Notes: Of the 150 or so species of *Eriogonum*, all but one (this S. American) are native to N. America; from the Greek *erion*, wool, and *gony*, knee or joint, referring to the woolly stems of some species; roots and leaves were apparently eaten by some native people, the species called "make-nose-bleed" by the Blackfoot Indians, this supposedly the effect of the roots when too much was consumed; many umbrella-plants (including ours) make excellent rock garden ornamentals, some important as a nectar source for honey bees, said to produce honey of superior quality.

POLYGONUM L. - Knotweed; Smartweed

Common Characteristics

- Annuals or perennials with alternate, entire leaves.
- Stem joints swollen and stipules usually evident.
- Flowers mostly perfect, calyx usually 5 (4-6)-lobed.
- Stamens usually 5, sometimes 3-9.
- Styles or stigmas 2 or 3; achenes lens-shaped or 3-sided accordingly, usually not exserted.

Key to Polygonum

1. Flowers in terminal, more or less compact racemes; ocreae truncate, usually not lacerate; leaves from 2-20 cm. long. 2

Flowers in axillary clusters, or solitary in leaf axils; ocreae lacerate with age; leaves no more than 3 cm. long; weedy species. 5

2. Leaves mostly basal, stem erect and simple, raceme terminal, solitary, spike-like; terrestrial plants. 3

Leaves cauline, stems usually branched and with several spike-like racemes; wetland (sometimes aquatic) plants. 4

3. Racemes often pinkish, oblong and at least 1 cm. broad, without bulblets; achenes shiny; restricted to S. Rocky Mountains/Cypress Hills. *P. bistortoides*

Racemes white, linear, no more than 8 mm. broad, with bulblets; achenes not shiny; widespread. *P. viviparum*

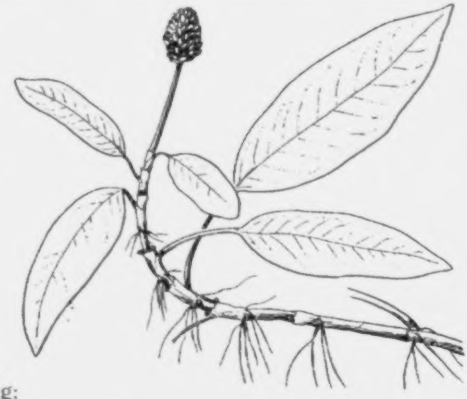
4. Racemes ovoid-oblong, blunt, mostly less than 4 cm. long; peduncles glabrous. *P. amphibium*

Racemes long-pointed, often more than 4 cm. long; peduncles glandular-hairy. *P. coccineum*

5. Leaves of stems and branches nearly equal in size; calyx lobes about equal to tube in length; achenes with a short concave face and two longer convex faces, to 2.8 mm. long; perianth greenish with pink margins. *P. arenastrum*

Leaves of stems much longer than those of branches; calyx lobes longer than tube; achenes with 3 nearly equal concave faces, 2.5-3.5 mm. long; petals white to pink, with pink margins. *P. monspeliense*

Polygonum amphibium L. - Water Smartweed



Growth Habit: Perennials with **thick, black, extensive rhizomes; stems reclining and freely rooting** at base, the tips erect, up to 8 dm. long, bristly-hairy to nearly hairless; terrestrial forms more erect.

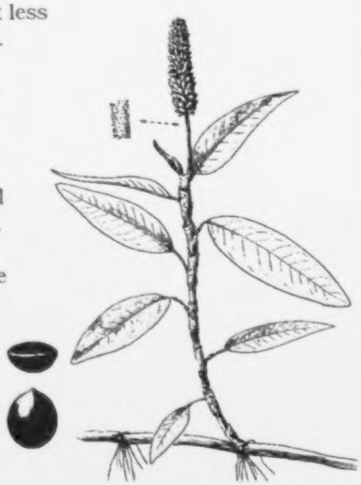
Blades: Cauline, **to 15 cm. long, oval-oblong, blunt to pointed** at tip, with stalks 1-4 cm. long; blades on terrestrial forms more hairy.

Stipules: Cylindrical, hairless to bristly-hairy, the tips often bristly, not lacerate, **sometimes with a spreading collar**.

Inflorescence: Racemes **spike-like, terminal**, ovoid-oblong and **blunt** at top, **1-3 (4) cm.** long, the flower stalks thick, **mostly hairless, never glandular;** calyx 4-5 mm. long, **pink to reddish**, the 5 segments oblong; fruit lens-shaped, 2.5-3 mm. long, dark brown-black, smooth, shining.

Similar Species:

1. ***Polygonum coccineum*** Muhl. - Water Smartweed; Water Ladysthumb
   Found in similar habitats but less common in northern regions.
   Differs as follows:
   - Blades slightly longer (in aquatic forms), 5-20 cm. long, more often long-pointed; as with *P. amphibium*, terrestrial forms more bristly-hairy.
   - Sheaths usually bristly-hairy below, bristly above and usually without leaf-like collar.
   - Racemes more slender, 3-12 cm. long, tapering at top, their stalks glandular and usually hairy.



Habitat & Distribution:

Common throughout all ecoregions. A wetland species, either semi-aquatic, or growing on shores with periodic inundation; occasionally more or less terrestrial, found in depressional areas, around sloughs.

Forage Value:

Poor, with an inferior nutrient content, and the acrid juice of many species has been known to cause minor skin irritation, gastrointestinal disturbance and possibly photosensitization; fortunately, plants are generally unpalatable and eaten rather sparingly even on overgrazed pastures.

Grazing Response:

An increaser, producing an abundance of viable seed, and spreading when more palatable species decline as a result of overgrazing.

Notes:

From the Greek *polys*, many, and *gony*, knees, alluding to the jointed stems; *amphibium*, because the species is adapted to both life on land and in shallow water; seeds of some species were traditionally ground into flour, others have leaves that were used for peppery or nutty flavoring, also used medicinally by some native people as a poultice for skin disorders; although essentially worthless as range plants, the tendency of many *Polygonum* species to inhabit denuded sites makes them of some value in preventing soil erosion; it must be noted that, within most families, there are a number of annual weedy species, and certainly *Polygonaceae* is no exception; as a rangeland text, however, many of these have been eliminated as they are problematic primarily in cultivated annual crops; only those that pose a threat to native sites and perennial forage crops, also those that tend to become (often beneficial) pioneers on disturbances in rangeland, will be included as relevant material.

Polygonum arenastrum Jord. *ex* Bor. - Common or Yard Knotweed

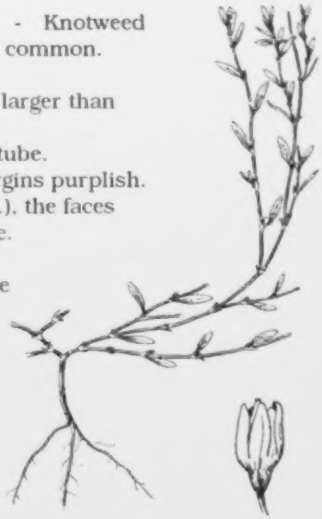
Growth Habit: Annuals (short-lived perennials); stems **spreading-prostrate**, sometimes erect-ascending when growing among other vegetation; main branches 1-8 dm. long, these often much branched.

Blades: Leaves **narrowly lanceolate to oblong-lanceolate**, thin to thick, **5-15 mm. long**, often bluish-green, secondary nerves prominent; ocreae silvery, becoming lacerate.

Inflorescence: Flowers **in axillary clusters of 1-5;** calyx 2-3 mm. long, **green with pink or white margins**, the lobes and tube about equal in length, pedicels erect; achenes dull brown, **2-2.5 mm. long, with 2 convex faces and a shorter concave face.**

Similar Species:

1. ***Polygonum monspeliense*** Pers. - Knotweed
   Also introduced, apparently less common. Differs as follows:
   - Stems with leaves distinctly larger than branch leaves.
   - Calyx lobes longer than the tube.
   - Calyx white to pink, the margins purplish.
   - Achenes larger (2.5-3.5 mm.), the faces more or less equally concave.



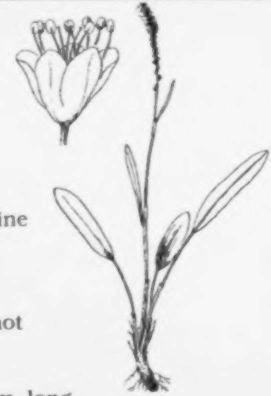
Habitat & Distribution: Introduced, common. Found in waste and disturbed places, in yards.

Forage Value: Poor, as with other knotweeds, unpalatable and producing small quantities of forage, also possibly mildly toxic due to the acrid juice content in the foliage.

Grazing Response: Invaders, and although aggressive on disturbances, are not persistent in rangeland with the re-establishment of native species.

Notes: Syn. *P. aviculare*, the taxonomic complex includes both *P. arenastrum* and *P. monspeliense*; common knotweed is no doubt best known for being among the first species to appear after disturbance; in rangeland, this can actually be beneficial in binding soil, also in providing ground cover that may discourage the establishment of more problematic and persistent weeds. *Note*: *P. lapithifolium* L. is found throughout, usually on disturbed (often shoreline) sites; plants are often reclining, with lanceolate leaves 5-18 cm. long and glandular; ocreae entire to slightly fringed; spikes several, peduncles glandular, flowers pinkish.

Polygonum viviparum L. - Alpine Bistort



Growth Habit: Perennials from **scaly, thick, corm-like rootstocks**, forming short, stout rhizomes; stems 1-3 dm. tall, erect, smooth.

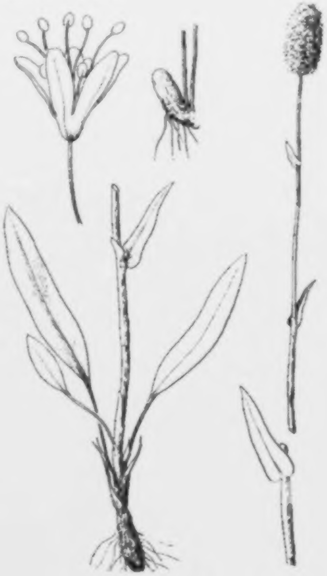
Blades: **Mostly basal**, often also 1-2 cauline; basal **long-petioled, oblong-ovate to lanceolate, often subcordate at base**; cauline leaves narrower with shorter petioles.

Stipules: Brown, long-sheathing and open on one side, 2-5 cm. long with oblique tips, not lacerate, glabrous.

Inflorescence: Racemes **solitary, spike-like, linear**, 3-8 cm. long and **5-8 (10) mm. wide**; the **lower half usually with pink-purplish bulblets**; flowers of upper half white to pale pink, mostly imperfect and sterile; perianth 5-lobed; stamens, when present, 8, exserted; styles 3, achenes 3-angled, brownish, dull.

Similar Species:

1. ***Polygonum bistortoides*** Pursh - Bistort
   Restricted to the southern Rocky Mountains and Cypress Hills where sometimes locally abundant. Grows in moist meadows, along streams, in low grassland. Differs as follows:
   - Plants stouter and taller (2-7 dm. tall), from thickened roots.
   - Racemes white to pink, oblong, at least 1 cm. thick.
   - Bulblets lacking.
   - Achenes shining.



Habitat & Distribution: Very common in the foothills and southern Rocky Mountain region, with sporadic occurrences in the north and east. Found in depressional foothills grassland, moist woods. Frequently associated with tufted hair grass near fens and in low lying meadows along streams.

Forage Value: Poor to fair, palatability ratings vary from one region to the next dependent on the value and abundance of associated vegetation; *P. bistortoides* is more restricted in its range, but where it does occur, is sometimes abundant and produces considerable amounts of forage, the roots also known as a food source for bears and rodents.

Grazing Response: Increasers.

Notes: *P. viviparum* produces bulblets within the inflorescence, these wind-borne and capable of producing new plants; the name *viviparum* refers to this process, translating "to bring forth new life"; *P. bistortoides* has a thick, knotted root (hence the name knotweed) which was a nutritious food source to rather widely distributed groups of native people, including Eskimos, the Blackfoot and Cheyenne; medicinal uses were rather extensive, listed as a strong astringent, anticeptic, diuretic and alterative; internally, decoctions were taken for cholera, diarrhea, dysentery, and externally, applied to treat small pox, pimples, insect stings, snake bites, and to stop bleeding from cuts and wounds.

RUMEX L. - Dock; Sorrel

Common Characteristics

- Mostly perennials, roots thick, rhizomatous, fibrous, or taproots.
- Blades various but not kidney-shaped, cauline and basal, with strongly sheathing stipules.
- Inflorescence an aggregate of small clusters.
- Flowers perfect or sometimes imperfect, with 6 segments, in two whorls of 3.
- Fruit 3-angled.
- Inner sepals enlarged, sometimes developing small grains (tubercles).

Key to Rumex

1. Dioecious plants with leaves cordate/sagittate at the base; montane-alpine (native species). *R. acetosa*

Plants with perfect flowers; leaves not sagittate; mostly not alpine. 2

2. Strongly rhizomatous plants of sandy places; valves large, reddish, showy, 1-3 cm. broad. .... *R. venosus*

Rhizomes absent; valves smaller. 3

3. Annuals with long marginal teeth on valves ("spiny"); tubercles about 0.4 mm. wide. *R. maritimus*

Long marginal teeth on valves absent. 4

4. Tubercles 0-1, not conspicuous; joints on pedicels obscure. *R. occidentalis*

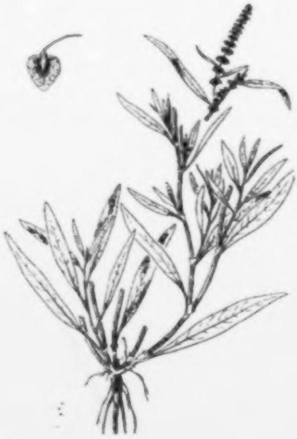
Tubercles evident, 1-3; pedicel joints evident. 5

5. Leaf margins distinctly wavy-curled; axillary branches below inflorescence mostly absent; introduced. *R. crispus*

Leaf margins at the most obscurely wavy; axillary branches usually present; native. *R. triangulivalvis*

Rumex triangulivalvis (Dans.) Rech. f. - Narrow-leaved Dock

Growth Habit: Hairless **perennials from strong taproots**; stems ascending-erect, **2-6 dm. tall, several-branched above from axils.**

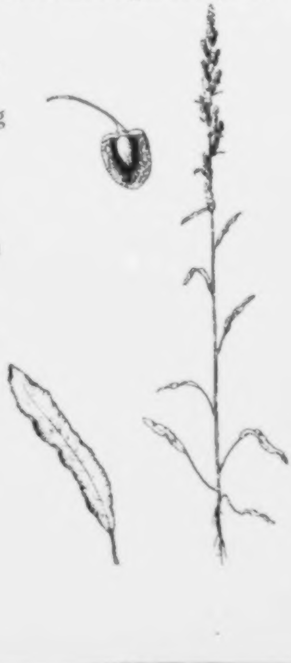


Blades: Numerous, mostly cauline, not strongly reduced above, the lowest short-stalked, the upper nearly stalkless; blades **5-10 cm. long, oblong-oval to lanceolate, narrowed at both ends, the margins not wavy-crisped**; pale green to glaucous.

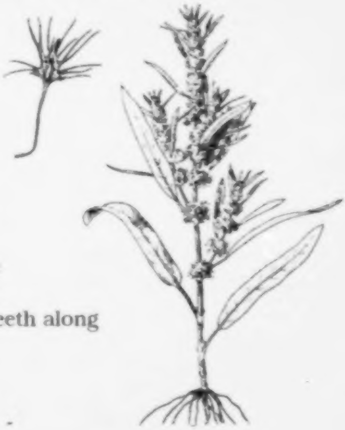
Inflorescence: Panicles 1-3 dm. long, the branches ascending, up to 1/2 the plant height; flowers in whorls, **their stalks with distinct joints, greenish-brown to pink-tinged**; outer perianth to 2 mm. long, the **inner 2.5-3 mm. long, broadly triangular**, the margins nearly entire, **all developing tubercles**, these to 0.75 the length of sepals; achenes smooth, about 2 mm. long.

Similar Species:

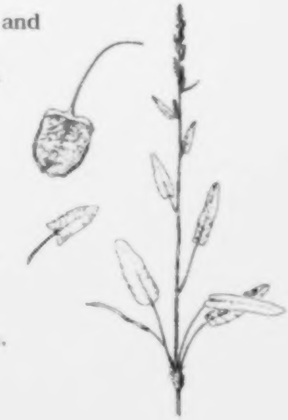
1. ***Rumex crispus*** L. - Curled Dock
An introduced species, found in moist, often waste places. Becoming common in southern regions, sometimes forming continuous stands in wetlands.
Differs as follows:
    - Taproots distinctly yellow when cut in cross-section.
    - Stems usually without axillary branches below inflorescence.
    - Blades with strongly wavy-curled margins.
    - Valves more ovate and blunt.
    - Pedicel joints evident.



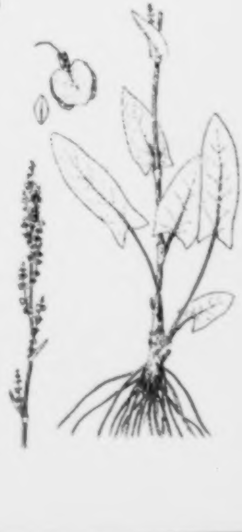
2. ***Rumex maritimus*** L. ssp. ***fueginus*** (Phil.) Dusen - Golden Dock
Frequent throughout in moist saline areas.
Distinguishing features:
- Bushy annuals (biennials) 2-6 dm. tall.
- Blades oblong, the margins "crisped"-wavy.
- Panicles large with many whorls of flowers.
- Flowers green-bronze, the inner 3 sepals developing conspicuous bristle-like teeth along their margins.
- Tubercles 3 per flower.



3. ***Rumex occidentalis*** S. Wats. - Western Dock
Most frequent in foothills, montane and boreal forest regions, occasional elsewhere; grows in swampy places, on shores, often in depressions which dry later in the season.
Distinguished by:
- Taprooted perennials 5-18 dm. tall.
- Lowest blades large (10-30 dm. long), long-stalked, cordate at the base.
- Pedicel joints obscure.
- Inner sepals triangular, reddish, veiny, 3-10 mm. long at maturity.
- Tubercles absent.



4. ***Rumex acetosa*** L. ssp. ***alpestris*** (Scop.) Love - Sorrel
A native element of the *acetosa* complex, found in moist meadows from montane to alpine elevations.
Distinguished as follows:
- Glabrous plants 2-8 dm. tall.
- Stems robust, ridged.
- Ocreae mostly not fringed.
- Leaves stalked below, sessile/clasping above.
- Leaves sagittate to cordate at base, oblong-lanceolate, to 10 cm. long.
- Plants dioecious, panicles reddish, leafless, the pedicels very slender.



- Staminate sepals to 3 mm. long.
- Pistillate outer sepals reflexed, to 2 mm. long, the inner to 5 mm. long and reticulate/veiny in fruit (valves).
- Tubercles on valves present.

Habitat & Distribution: Common throughout all regions. Found in moist sites: on shores, around sloughs, often in moderately saline areas.

Forage Value: Poor, seldom grazed to any extent and the genus as a whole mildly toxic (although seldom troublesome) due to the tendency of plants to accumulate oxalates.

Grazing Response: Increasers, producing an abundance of seed and spreading when overgrazing depletes better quality range plants.

Notes: Syn. *R. mexicanus*; *Rumex* or *ru-meks* comes from the ancient Latin name used by Pliny for some members of the dock genus; due to an oxalate content, the leaves of dock species are tart and rhubarb-like and were boiled and eaten by Indians; although large amounts can be toxic, the foliage is high in a variety of nutrients, especially vitamins A and C; seeds were also gathered and ground into flour; taken internally or used as a poultice, dock had medicinal value for a variety of ailments.

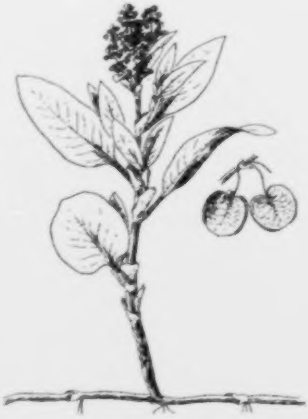
Rumex venosus Pursh - Veined Dock; Wild Begonia; Sand Dock

Growth Habit: Perennials with **thick, scaly, woody, extensive rhizomes**; stems mostly erect, 1-5 dm. tall, with several ascending branches; stems **often red-tinged**, ridged, hairless.

Blades: Numerous, cauline, **firm, leathery**, the lowest smaller, **upper ovate to lanceolate or oblong**, short-stalked, entire, **5-11 cm. long, often reddish**.

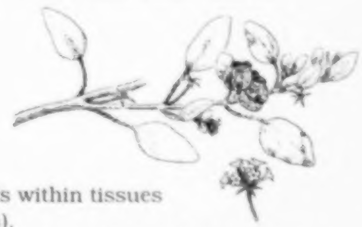
Stipules: **Very conspicuous, dilated, white-membranous, 1-3 cm. long.**

Inflorescence: Panicles small, interrupted, appearing dense as fruiting valves enlarge; pedicels obscurely jointed at about the middle, 1-2 cm. long at maturity; perianth 4-5 mm. long, **the inner expanding to 15-20 mm. long in fruit, reddish, circular and heart-shaped, membranous and net-veined**; tubercles absent; achenes 5-6 mm. long, smooth.



Similar Species:

1. ***Abronia micrantha*** Torr. - Sand Puffs; Sand Verbena



Occasional in the southern prairie region, found in sandy soil.

Distinguishing features:

- Member of the four-o'clock family (*Nyctaginaceae*).
- Foliage often with crystals within tissues (as seen with a 10 X lens).
- Annuals, reclining and trailing, branches with ascending tips.
- Blades ovate, 2-6 cm. long, 1-3 cm. wide, opposite.
- Flower bracts 5-10 mm. long, lanceolate, not fused.
- Flowers perfect, sessile, petals absent.
- Fruit an achene, with conspicuous papery veiny wings, about 2 cm. long.

Habitat & Distribution: Very common throughout the prairies. Found primarily in sandy areas, in active dunes, sandy grassland, on roadsides, dry gravelly soil, dry banks and slopes, usually in open sand or disturbed areas.

Forage Value: Poor, similar to that of other *Rumex* species.

Grazing Response: An increaser, reproducing readily by both seeds and rhizomes in exposed sandy soil but not persisting in stabilized dunes when other vegetation cover becomes dominant.

Notes: The specific name *venosus* appropriately refers to the veiny, enlarged perianth at maturity; traditional uses of the species were apparently rather limited, although an orange dye was extracted from the peeled rhizomes by the Blackfoot Indians, the foliage probably also eaten; a very attractive species, veined dock has potential as an ornamental on dry sites, and also is an aggressive pioneer on loose sandy soil, and as such is valuable in stabilizing dunes and disturbances in sandy rangeland.

CHENOPODIACEAE - Goosefoot Family

Common Characteristics

- Annuals, perennials, herbaceous or sometimes shrubby.
- Leaves alternate, without stipules or pale bracts.
- Leaves often fleshy and/or white-mealy.
- Flowers small, few in leaf axils, or in terminal clusters, perfect or imperfect.
- Corolla absent, calyx greenish, of 5 or less united sepals.
- Stamens usually as many as perianth segments and opposite them (sometimes less).
- Ovary superior.
- Fruit with a thin wall (pericarp), 1-seeded, small, either enclosed by the calyx or by a pair of small bracts in some species.

Key to Herbaceous Chenopodiaceae

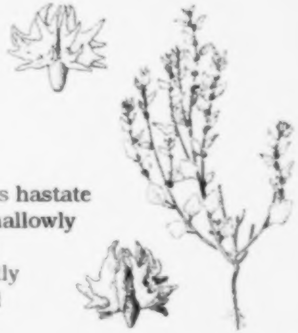
1.	Stems jointed and fleshy; leaves opposite, scale-like; flowers sunken into stems; plants of highly saline/alkaline sites.	*Salicornia*
	Plants not as above.	2
2.	Plants prickly, the linear leaves and bracts spine-tipped; weedy.	*Salsola*
	Spine-tipped bristles absent.	3
3.	Flowers entirely monoecious or dioecious, the pistillate with 2 (3) bracteoles.	4
	Flowers perfect or with some unisexual; bracteoles absent.	5
4.	Annuals with stellate hairs, with numerous branches; flowers monoecious; bracteoles mostly in 3's.	*Axyris*
	Stellate hairs lacking; foliage often with white, crusty scales.	*Atriplex*
5.	Leaves broad, often with divergent basal lobes.	6
	Leaves narrow-linear, basal lobes absent.	7
6.	Stamens more than 1; fruit not exposed, without wings.	*Chenopodium*
	Stamen 1; fruit exposed at maturity, with narrow wings; weedy.	*Monolepis*
7.	Bushy annuals with pubescent inflorescence; leaves ciliate (not stellate); calyx somewhat hairy, sepals developing short wedge-shaped wings in fruit; introduced, weedy.	*Kochia*
	Plants glabrous or mealy or with stellate hairs.	8
8.	Plants without white scales, instead green and with stellate hairs; bract margins pale-hyaline; in sandy places.	*Corispermum*
	Stellate hairs lacking.	9
9.	Plants without white mealy scales; succulent, blackish at maturity; of alkaline sites.	*Suaeda*
	Plants with white mealy scales, most species not succulent.	*Chenopodium*

ATRIPLEX L. - Orache; Saltbush

Common Characteristics

- Herbs or low shrubs.
- Foliage usually scruffy-mealy, often silvery.
- Blades alternate (or lowest opposite).
- Plants monoecious or dioecious.
- Flowers in dense axillary clusters or in compound spikes.
- Staminate flowers with a 3-5 lobed calyx and 3-5 stamens.
- Pistillate flowers without sepals (usually), but with a pair of bracteoles.
- Bracteoles uniting and enlarging in fruit, often hardened and with tubercles on the surface.

Atriplex argentea Nutt. - Silver Saltbush



Growth Habit: **Annuals, freely branching from the base, usually rounded-bushy and spreading; stems 15-80 cm. tall,** stout, angled, white-farinose, at least when young.

Blades: **Leaves 1-3 cm. long, ovate to deltoid,** sometimes broadly lanceolate, the bases **hastate to cuneate, the margins mostly wavy-shallowly dentate; blades grey-scrufy,** sometimes grey-green above; lowest blades distinctly stalked, opposite, becoming sessile and alternate above.

Inflorescence: Flowers monoecious, the pistillate mostly axillary, the staminate usually above in interrupted terminal spikes; fruiting bracteoles united to the middle or above, **obovate and deeply dentate-lacerate, 4-8 mm. long;** bracteoles hardened but the margins green.

Habitat & Distribution: Frequent in prairie regions. Grows on dry plains, on eroded and exposed slopes, on clay flats, especially common on and an indicator of alkaline clays.

Forage Value: Fair, this rating given for herbaceous members of the genus as a group; in comparison to the highly esteemed woody *Atriplex* species, they are similar nutritionally, but less palatable, also produce inferior amounts of forage.

Grazing Response: Increasers.

Notes: The genus is represented by more than 100 species, most of these found in dry, desert-like situations; the young foliage of our herbaceous species is nutritious, and can be eaten either raw or cooked, and in some areas has been used rather extensively in the past; a number of our *Atriplex* species are valued in providing ground cover on droughty, denuded sites, *A. argentea*, in particular, well adapted to dry exposed slopes and alkaline clay flats.

CHENOPODIUM L. - Goosefoot; Pigweed

Common Characteristics

- Annuals.
- Leaves linear to ovate, usually white-mealy.
- Flowers perfect, greenish, in axillary or teminal clusters.
- Perianth with 5 lobes, these sometimes crested, persistent and enclosing fruit.
- Fruit with one lens-shaped seed, not winged.

Key to Chenopodium

1. Seeds mostly vertical. 2

Seeds mostly horizontal. 3

2. Foliage green, not white-mealy; flowers in large clusters; calyx fleshy-bright red at maturity. *C. capitatum*

Foliage white-mealy below, leaves with thick margins, these slightly revolute; flowers in axillary and terminal spikes; calyx greenish. *C. salinum*

3. Leaves narrow (linear-lanceolate), often with a few lobes near base; calyx lobes not strongly keeled. *C. pratericola*

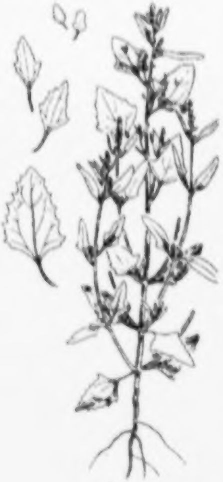
Leaves broader (ovate-lanceolate); calyx lobes keeled. 4

4. Leaves relatively thick, fleshy, triangular or 4-sided, with a pair of lobes near base; seed coat shiny. *C. fremontii*

Leaves thinner, ovate to lanceolate, more distinctly toothed on margins. *C. album*

Chenopodium album L. - Lamb's-quarters

Growth Habit: **Taprooted annuals**, stems **stout, 4-12 dm. tall, much branched**, mostly erect, **usually red-tinged with age.**

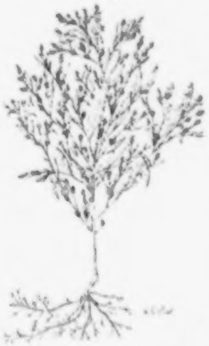


Blades: Leaves **ovate to lanceolate, 3-10 cm. long**, at least the larger **wavy to shallowly lobed along margins; dull grey and mealy** or greener and sparsely white-mealy above.

Inflorescence: Flowers **in terminal clusters**, often grey-bluish-tinged; **calyx white-mealy**, the lobes rather strongly keeled and covering the fruit; seeds horizontal, **blackish, smooth and shining**, not pitted, 1.1-1.6 mm. long and nearly as wide.

Similar Species:

1. ***Axyris amaranthoides*** L. - Russian Pigweed
   An introduced annual, becoming common, especially in the south. Found in waste places, sometimes in rangeland on disturbed soil. Superficially resembling lamb's-quarters.
   Differs as follows:
   - Stems, flower axis, leaves (especially beneath), bracteoles, and sepals with felty, star-shaped hairs.
   - Flowers imperfect.
   - Staminate flowers in short terminal spikes.



- Pistillate flowers axillary or sometimes intermixed with staminate.
- Seeds of two types: the larger 2.5-3 mm. long, flattened, silky, with a 2-lobed membranous wing at the top; the smaller 1.5-2 mm. across, circular, grey-brown and barely notched at the top.

2. ***Chenopodium pratericola*** Rydb. - Narrow-leaved Goosefoot
A weedy native, similar to *C. album* in its response on disturbed soil, also found on sandy and moist alkaline sites.
Distinguished as follows:
   - Tall, branching, mealy annuals, 2-6 dm. high, stems yellow-green veined.
   - Leaves narrow (linear to linear-lanceolate), often with a few lobes toward base, mealy, at least below; most 3-veined.
   - Flowers in glomerules, these in paniculate spikes.
   - Calyx lobes not strongly keeled, pericarp loosely attached.

3. ***Chenopodium fremontii*** S. Wats. - Goosefoot
Frequent in the southern prairie region, often on moist saline soil and sometimes in shaded places.
Distinguished as follows:
   - Annuals to 10 dm. tall, branches flexuose-ascending.
   - Blades thick, triangular-4-sided, the apex round but sharp-pointed.
   - Blades entire to wavy-toothed, with basal lobes.
   - Leaves green above, somewhat grey mealy below.
   - Flowers in spikes, in axils and terminal.
   - Calyx lobes keeled.
   - Seed coat shiny, seeds to 1.3 mm. long and 1.2 mm. wide.

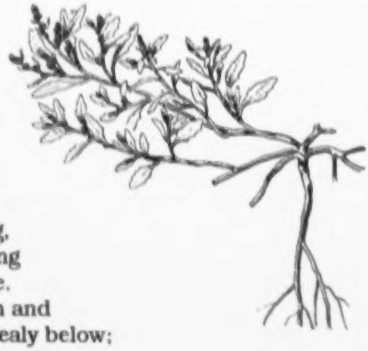
Habitat & Distribution: An introduced weed found in gardens and cultivated ground, along roads and on other disturbances.

Forage Value: Poor, providing relatively small amounts of forage which is seldom eaten by livestock; like *Rumex* species, plants can accumulate small amounts of oxalates but are rarely troublesome under normal conditions.

Grazing Response: An invader, native to Eurasia; C. *album* has a rather remarkable reproductive capacity: seed retains viability for an exceptionally long time, remains dormant in the soil for years, then germinates when disturbances occur; the species also produces an abundance of seed, one study showing as many as 70,000 seeds per plant; a poor competitor, however, lamb's-quarters is rarely troublesome in native rangeland.

Notes: From the Greek *chen*, goose, and *podos*, foot, because of the leaf shape of some species; *album* translates pale or white, alluding to the characteristic mealy coating on foliage; lamb's-quarters has been widely used in the past as a salad green, also cooked, and the seeds often ground into flour; the foliage is known for its especially high beta carotene and vitamin C content, although when taken in large quantities, it can be toxic; C. *album* has been used to produce a green dye, which is obtained by boiling the foliage; in spite of its weedy nature, lamb's-quarters is useful as a pioneer on disturbances in preventing erosion while better quality species establish, and never persists once a site is revegetated.

Chenopodium salinum Standl. - Oak-leaved Goosefoot



Growth Habit: **Low annuals** with slender taproots; **stems 1-4 dm. long, branched from the base, and prostrate to semi-erect,** green and yellow veiny-striate, **glabrous or minutely farinose above**.

Blades: **Numerous, cauline, 1-3 cm. long, broadly lanceolate to ovate-oblong in outline,** acute, **sinuate-dentate,** petiolate, **slightly fleshy, greenish and glabrous above, glaucous and mealy below; margins thickened and slightly revolute**.

Inflorescence: Flowers sessile in short, mostly bracteate axillary and terminal spikes; calyx glabrous, not keeled; pericarp green, very thin, not adherent to seeds; seeds about 1 mm. broad, **positioned both vertically and horizontally.**

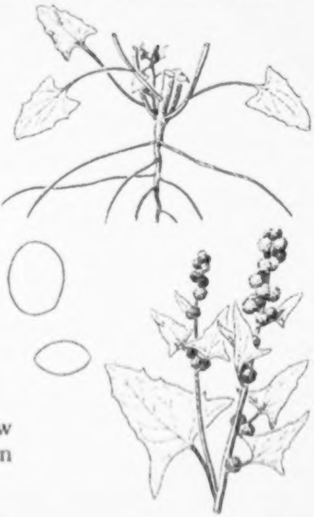
Similar Species:

1. ***Chenopodium capitatum*** (L.) Aschers. - Strawberry Blite

Locally an introduced species, common in disturbed places, on burns, in clearings, along trails.

Distinguished as follows:

- Plants 2-5 dm. tall, without white-mealy coating.
- Leaves triangular, sharply toothed.
- Flowers in dense, rounded clusters, bright red and fleshy when mature.



Habitat & Distribution:

Frequent in prairie and parkland regions. Found in moist saline and alkaline places: around sloughs, in low alkali flats. Also rather weedy, found in various waste and disturbed sites.

Forage Value:

Poor; although an oxalate accumulator, *C. salinum* rarely produces enough herbage to be problematic.

Grazing Response:

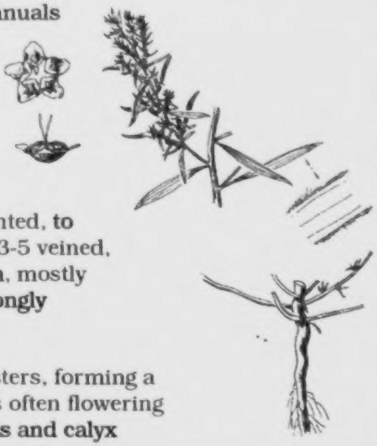
An increaser.

Notes:

Syn. *C. glaucum*; the specific name *salinum* refers to the saline tolerance of the species; an edible plant, but unproductive and generally was not a part of the diet of native people; *C. capitatum*, on the other hand, has been a familiar pot herb, and there are some indications that it may have been cultivated for this purpose; typical of its genus, the plants can be mildly toxic due to oxalates, and in some habitats, nitrate accumulations; decoctions of the plants have been used to relieve throat and mouth ulcers, and a red dye can be obtained from the "berries", at one time used in Indian war paint; *C. salinum* is one of several small goosefoots capable of quickly revegetating denuded sites, but does not compete in the event that better quality perennial species become established; *C. capitatum* has a similar response in clearings and burned areas, and is often surprisingly photogenic, with the bright red seed clusters, in many cases contrasted by a darkened-charred backdrop.

KOCHIA Roth - Kochia

Kochia scoparia (L.) Schrad. - Summer Cypress; Burning Bush



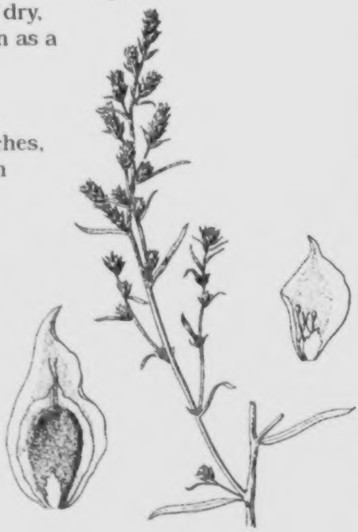
Growth Habit: Erect, **freely branched-bushy annuals 5-15 dm. tall**; stems and branches usually **long-hairy with rusty to silvery hairs**, sometimes nearly hairless, **red-purple in the fall**.

Blades: Leaves alternate, **linear to narrowly lanceolate**, entire, pointed, **to 6 cm. long**, rather prominently 3-5 veined, **rusty/silvery silky-hairy beneath**, mostly hairless above, the **margins strongly hair-fringed**.

Inflorescence: Flowers solitary or a few in clusters, forming a compound inflorescence, plants often flowering over much of their length, **bracts and calyx loosely and moderately rust/silvery long-hairy**; bracts leaf-like, linear-lanceolate; **calyx 5-cleft**, the flowers mostly perfect, sometimes pistillate, persisting and **each sepal forming a short wedge-shaped pale wing in fruit**.

Other Species:

1. ***Corispermum hyssopifolium*** L. - Bugseed
   A prairie/parkland species of dry, open places, especially known as a sand dune plant.
   Distinguished as follows:
   - Annuals with firm green-reddish, spreading branches, these often reclining from plant base.
   - Plants 1-6 dm. tall, with stellate pubescence.
   - Leaves simple, linear, alternate, 1-nerved.
   - Flowers perfect, in dense spikes.
   - Bracts 5-9 mm. long, lanceolate-ovate, wider than seeds, with conspicuous pale margins.
   - Fruit winged, 3-4 mm. long.

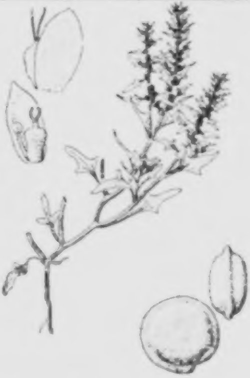


Habitat & Distribution: An introduced weed, common in southern regions. Found on all types of disturbances.

Forage Value:	Poor, generally ungrazed and of little value as a range plant; utilization can cause photosensitization in cattle, resulting in poisoning and occasionally death.
Grazing Response:	An invader, Eurasian in origin, introduced as an ornamental species; *Kochia* is a prolific seed producer, and is persistent in waste and disturbed places and in cultivated fields, but does not survive in rangeland once perennials establish.
Notes:	Named for W. D. J. Koch, 1771-1849, a German botanist; the common name "burning bush" refers to the red-purple-tinged stems in the fall; *Kochia* has been recognized as having some value in providing cover and binding soil in saline and alkaline areas, and apparently functions to some extent to reduce soil salinity.

MONOLEPIS Schrad. - Spear-leaved Goosefoot

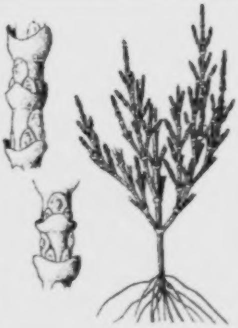
Monolepis nuttalliana (Schultes) Greene - Spear-leaved Goosefoot



Growth Habit:	**Annuals** from slender taproots; **stems freely and many-branched** from base, **prostrate to ascending, 1-3 dm. long**, glabrous to very sparsely farinose, sometimes reddish-tinged.
Blades:	**Thick and somewhat fleshy, 1-5 cm. long, lanceolate-oblong, with 2 divergent basal lobes, occasionally a few small teeth above; glabrous to lightly farinose**.
Inflorescence:	Flowers in small, dense axillary bracteate clusters, green or reddish-tinged; **sepals 1 per flower**, to 2.5 mm. long; **stamens** 1; stigmas 2; **pericarp adherent to seed, pitted**.
Habitat & Distribution:	Frequent and widespread, less common northward. Native to moist saline and alkaline areas. Also weedy, found on disturbances in rangeland, on roadsides, in cultivated fields.
Forage Value:	Poor, unpalatable and essentially worthless to grazing animals.
Grazing Response:	An increaser.
Notes:	The generic name, in Greek, is *mono*, solitary, and *lepis*, scale, alluding to the single sepal; *Monolepis* is one of a number of annual weeds that can be a nuisance in cultivated situations, but is of some benefit as a pioneer on disturbed sites in native rangeland, effective in both preventing erosion and discouraging the establishment of more troublesome and persistent species.

SALICORNIA L. - Samphire

Salicornia europaea L. ssp. ***rubra*** (A. Nels.) Breitung - Samphire; Red Samphire



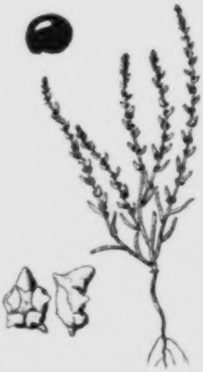
Growth Habit: **Small succulent annuals**, the **stems jointed, 5-25 cm. tall**, more **branched above**; stem branches erect-ascending; plants **hairless, turning bright red at maturity**.

Blades: Leaves **inconspicuous, reduced to broadly triangular opposite scales**.

Inflorescence: Flowering spikes 1-1.5 cm. long, the flowers perfect or pistillate, in groups of 3, **deeply sunk into the axis of the spike**; middle flower above the lateral two; calyx not lobed, **fleshy, opening by a small slit**; stamens 1 or 2, styles 2; seeds minutely hairy, enclosed in the spongy, enlarged calyx.

Similar Species:

1. ***Suaeda calceoliformis*** (Hook.) Moq. - Western Sea Blight
   Frequent in the prairie and parkland regions, occasional northward. Restricted to moderately to highly alkaline soils, usually found in moist or depressional places.
   Distinguishing features:
   - Erect to spreading, much-branched annuals.
   - Plants hairless, glaucous.
   - Blades linear, rounded, fleshy, to 4 cm. long.
   - Flowers small, greenish, each with 2 bracts and a fleshy 5-lobed calyx.
   - Plants turning almost black at maturity.



Habitat & Distribution: Widely distributed. Absent from higher altitudes in western regions. Restricted to wet saline or alkaline areas, found on saline shores, on alkali flats.

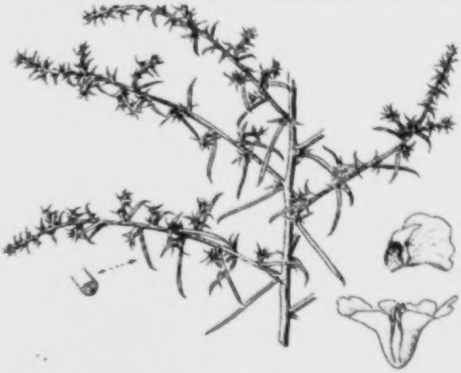
Forage Value: Poor, the species both unpalatable and producing little forage.

Grazing Response: Increasers.

Notes: Syn. *S. rubra*; from the Latin *sal*, salt, a reference to its saline adaptation, and *cornu*, horn, because of the horn-like branching of plants; appropriately named *rubra*, as plants turn red in the fall, often defining and outlining saline and alkaline sloughs; samphire can be valuable in stabilizing soils so highly saline or alkaline that few other species would establish; it is often associated with prairie bulrush (*Scirpus paludosus*) on these sites.

SALSOLA L. - Russian Thistle; Glasswort

Salsola kali L. - Russian Thistle



Growth Habit: Taprooted **rounded-bushy annuals**, 1-8 dm. tall; stems hairless to hairy, with **numerous branches**, striped, **often purplish**, becoming **hardened at maturity, breaking off at ground level and blown about as a tumble-weed.**

Blades: Leaves **rounded, narrowly linear, succulent**, 1-3 cm. long (or lower to 6 cm. long), **firm and spine-tipped**; upper leaves gradually smaller, intergrading into spiny bracts.

Inflorescence: Flowers **small**, perfect, mostly solitary in leaf axils, each with a pair of **spiny bracteoles; perianth of five segments, membranous, becoming winged-keeled on the back at maturity; perianth pink-purple-tinged**; stamens mostly 5, styles 2; fruit flattened-cup-shaped, about 2.5 mm. broad, enclosed by calyx.

Habitat & Distribution: An introduced species, common in southern regions. Grows in waste places, on cultivated ground, on disturbances in rangeland, sometimes in overgrazed pastures. Especially common in sandy soil.

Forage Value: Poor; although somewhat palatable and nutritious early in the season, plants become worthless once spines form and are only consumed in emergency situations; Russian thistle makes good hay if cut early.

Grazing Response: An invader, Eurasian in origin and thought to have been imported into N. America in flax; Russian thistle is considered a troublesome weed in the prairie region, primarily inhabiting waste, disturbed and cultivated sites, but rarely persisting in rangeland except under severely overgrazed conditions; *S. kali* is a prolific seed producer, also efficient in seed dispersal as panicles break off and become wind-borne tumble-weeds.

Notes: *Salsola*, a reference to salty, *kali* an Arabic name for potash, both names alluding to the saline sites it often occupies; also known as tumble-weed; a pioneer on dry, disturbed and often sandy sites, Russian thistle is of some value in erosion control, usually disappearing once perennial species establish.

AMARANTHACEAE Amaranth Family
AMARANTHUS L. - Amaranthus

Common Characteristics

- Annual herbs, prostrate to erect and bushy-branched.
- Blades alternate, petiolate, entire to shallowly dentate, exstipulate.
- Plants monoecious or dioecious, the flowers in axillary clusters or aggregated into axillary or terminal spikes.
- Flowers small, green to purplish, subtended by 3 spiny bracts.
- Corolla absent, calyx segments 2-5, distinct, dry and scarious, the midvein excurrent.
- Stamens 2-5, opposite the sepals, the anthers 4-celled.
- Ovary superior, 1-loculed, with 2-3 distinct styles.
- Fruit a 2-3 beaked capsule.
- Seeds 1 per capsule, flattened, smooth.

Key to Amaranthus

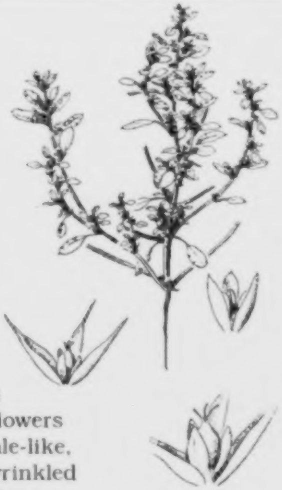
1. Plants bushy, diffusely branched, 2-6 dm. tall, erect or lower branches prostrate; leaves 1-4 cm. long; sepals 3, the pistillate about equal in size; stamens 1-3; bracts 2-3 mm. long. *A. albus*

   Plants mostly prostrate. 2

2. Leaves 5-15 mm. long, their margins wavy; sepals mostly 3, the pistillate very unequal; stamens 1-3; seeds about 0.7 mm. wide. *A. californicus*

   Leaves 1-4 cm. long; sepals 4-5, unequal; stamens 3-4; seeds about 1.5 mm. wide. *A. graecizans*

Amaranthus albus L. - Tumble-weed



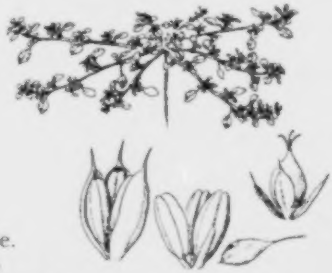
Growth Habit: **Bushy and diffusely branched glabrous to hairy annuals 2-6 dm. tall; stems whitish, rigid, the branches erect-ascending, or the lower prostrate-spreading; stems breaking off at the base and behaving as a "tumble-weed."**

Blades: **1-4 cm. long, oblong-obovate**, obtuse, slender-petiolate, the margins subentire, **with a thick whitish vein; blades conspicuously veiny**, the midvein extended as a short cusp.

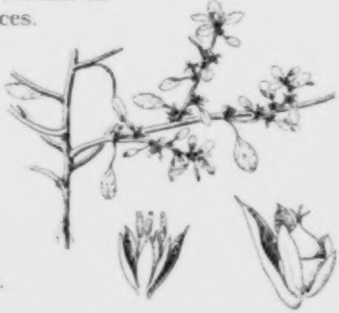
Inflorescence: **Flowers in short axillary clusters; bracts awl-shaped, spiny**, 2-3 times as long as flowers (2-3 mm. long); sepals three, narrow, scale-like, **nearly equal in size; stamens 1-3**; fruit wrinkled when dry, exceeding the calyx, the seeds lens-shaped, 0.7-1 mm. wide.

Similar Species:

1. ***Amaranthus californicus*** (Moq.) S. Wats. - Amaranth
Less common, found occasionally in southern regions. Also grows in waste places, but most often on lake shores, on moist alkaline flats.
Differs as follows:
    - Plants prostrate and mat forming.
    - Foliage green to red-purple.
    - Blades rhombic-elliptic to obovate, small (5-15 mm. long).
    - Leaf margins more often undulate-crisped.
    - Bracts smaller (1-1.5 mm. long).
    - Pistillate sepals very unequal, with one well developed and two reduced or absent.
    - Stamens 1-2 (3).
    - Seeds 0.7 mm. across.



2. ***Amaranthus graecizans*** L. - Prostrate Amaranth
Occasional in southern regions, found on disturbed ground, in waste places.
Differs as follows:
    - Stems prostrate, often purplish.
    - Bracts about as long as flowers.
    - Sepals 4-5, unequal in length.
    - Stamens 3-4.
    - Fruit scarcely wrinkled.
    - Seeds about 1.5 mm. wide.



Habitat & Distribution:

Frequent in southern regions, also in the northern parkland. Grows in waste and disturbed areas. Also in disturbances in rangeland but does not persist after perennials re-establish.

Forage Value:

Poor, unpalatable, and the genus as a whole known to accumulate dangerous levels of nitrates; actual cases of poisoning are uncommon unless animals are confined in areas where large infestations occur and good quality forage has been depleted.

Grazing Response:

An invader.

Notes:

As the common name suggests, *A. albus* is probably most often seen as a tumble-weed caught in fences and wind breaks in the prairie region; although an undesirable weed on cultivated sites, *A. albus* can be functional in rangeland as a pioneer on disturbances, providing cover, and at times displacing more troublesome species; as is the case with many of our annual weeds, cover diminishes as native perennial plant communities return.

NYCTAGINACEAE - Four-O'Clock Family

Common Characteristics

- Herbs (ours) with mostly opposite, simple, exstipulate leaves.
- Foliage often with visible crystals within tissue (as seen with 10 X lens).
- Flowers mostly in cymes, sometimes racemose or umbellate.
- Flowers perfect, regular, hypogynous.
- Flower bracts often forming a calyx-like involucre, this sometimes colored.
- Petals absent, calyx of 5 petaloid, basally fused sepals.
- Stamens 1-many.
- Ovary 1-celled, 1-ovuled, solitary.
- Fruit an achene, this often enclosed in the base of the persistent calyx.

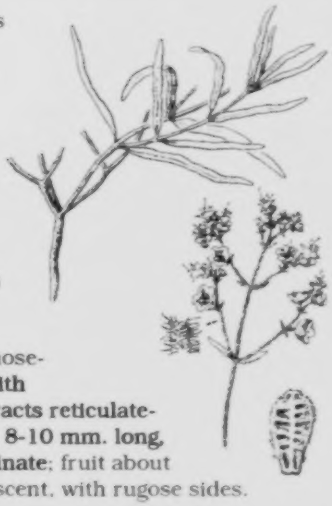
MIRABILIS L. - Umbrellawort

Common Characteristics

- Perennials, sometimes woody-based, from a rather thickened taproot.
- Stems usually swollen at the joints.
- Leaves opposite.
- Flowers pedicellate, borne singly or 2-4 per cluster.
- Bracts united, calyx-like.
- Calyx corolla-like, pink-purple, of united sepals, cup-shaped to funnel-shaped, 5- lobed.
- Calyx tube short, closely surrounding the ovary and constricted above it.
- Stamens 3-5, unequal, usually exserted.
- Stigma head-like.
- Fruit and the enveloping calyx tube 5-angled, or 5-ribbed.
- Involucre rotate, becoming much enlarged and membranous at maturity.

Mirabilis hirsuta (Pursh) MacM. - Umbrellawort

Growth Habit:	Taprooted plants 2-8 dm. tall, stems solitary or a few together, often glabrous below but **hirsute on the nodes, becoming densely glandular pubescent above**.
Blades:	**Leaves sessile or the lower short-stalked, linear-lanceolate, 4-9 cm. long; blades thick and somewhat succulent**, glabrous or somewhat viscid above, the **margins entire to wavy**.
Inflorescence:	**Flowers in an open** axillary and cymose-paniculate **inflorescence; pedicels with multicellular glandular hairs, the bracts reticulate-veiny; corolla absent; calyx pinkish, 8-10 mm. long, densely pubescent, the lobes emarginate**; fruit about 5 mm. long, 5-angled, densely pubescent, with rugose sides.



Habitat & Distribution: Frequent in southern regions. Grows in open dry places, especially common in sandy grassland, in dunes, on exposed slopes.

Forage Value: Poor, seldom grazed under normal conditions.

Grazing Response: Increasers with grazing pressure but populations always tending to be rather sporadic and of low prominence.

Notes: The name *Mirabilis* means wonderful, a reference to the attractive flowers of some members of the genus; umbrellawort has a natural preference for dry slopes and sandy sites where some exposed soil can be expected even in healthy plant communities; such species are valued for their persistence in sunny, droughty conditions and for their contributions to the stabilization of these sites.

CARYOPHYLLACEAE - Pink Family

Common Characteristics

- Annuals or perennials, herbaceous, swollen at nodes.
- Leaves mostly opposite, entire, simple, without stipules.
- Flowers usually perfect, petals and sepals each 4-5 (petals absent in a few species).
- Petals sometimes cleft, or modified into a narrow claw (base) and expanded blade.
- Stamens usually twice as many as petals.
- Styles 1-5.
- Fruit usually a capsule with several-many seeds, opening apically by valves or teeth of the same number or twice the number as styles.

Key to Caryophyllaceae

1. Stipules present, hyaline; fruit 1-seeded; petals absent; small moss/cushion-like plants of dry places. *Paronychia*

Petals mostly present; fruit several-seeded. 2

2. Sepals united; petals clawed (stalked); ovary stalked. 3

Sepals separated; petals without claws; ovary not stalked. 4

3. Flowers small, less than 5 mm. long; styles 2; large,bushy introduced species. *Gypsophila*

Flowers larger than 5 mm. long; styles 3-5; plants not large, bushy. *Silene*

4. Petals entire or slightly notched. 5

Petals deeply notched. 7

5. Leaves 1-3.5 cm. long, broad, mostly more than 3 mm. wide (elliptic to oblong-lanceolate). *Moehringia*

Leaves linear-lanceolate or, if broader, smaller. 6

6. Capsule opening by 3 valves. *Minaurtia*

Capsule opening by 6 valves. *Arenaria*

7. Styles commonly 5; capsule cylindric, opening by 10 teeth. *Cerastium*

Styles commonly 3; capsule ovoid, opening by 6 valves. *Stellaria*

CERASTIUM L. - Mouse-ear Chickweed

Common Characteristics

- Annual or perennial herbs, often glandular hairy, often rooting at nodes and mat-forming.
- Flowers several, in cymes.
- Sepals and petals usually each 5.
- Petals distinctly 2-lobed.
- Stamens and styles usually 10 and 5.
- Capsule cylindrical, often curved and exserted, opening by 10 teeth.
- Seeds numerous.

Key to Cerastium

1. Annuals, without basal offshoots; petals about the length of sepals; capsules nodding, conspicuously exserted, 2-3 times calyx length. *C. nutans*

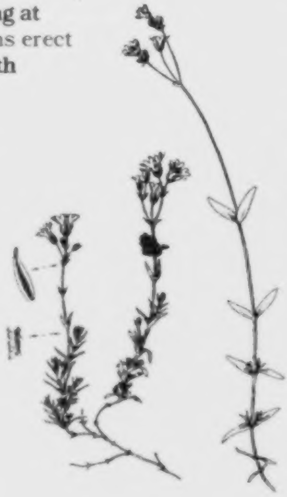
Perennials, basal offshoots present; capsules 1-2 times sepal length. 2

2. Petals about twice as long as sepals; leaves narrowly lanceolate. *C. arvense*

Petals equal to or shorter than sepals; leaves broader, oblong-lanceolate. *C. vulgatum*

Cerastium arvense L. - Mouse-ear Chickweed; Field Chickweed

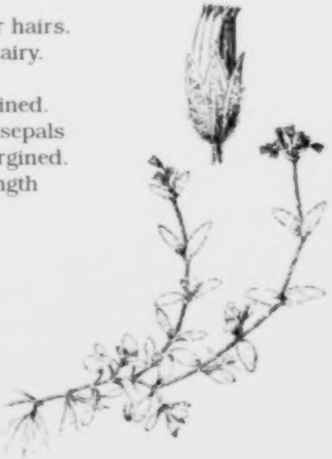
Growth Habit:	**Caespitose perennial**, stems **often rooting at nodes**, **forming mats** 1-3 dm. wide; stems erect to ascending, 0.5-5 dm. long, **usually with spreading hairs and often glandular**.
Blades:	**Linear-lanceolate**, 1-4 cm. long (lower, trailing leaves broader), usually with **secondary leaves in axils** or small sterile shoots.
Inflorescence:	Cymes with several flowers; stalks **erect**, slender, 1-3 cm. long; stamens 10, **styles 5**; sepals 4-6 (7) mm. long, and **petals 2-(3) times sepal length**, **deeply cleft**, **white**; capsules **cylindric**, **about 1.5 times calyx length at maturity**, **opening by 10 teeth**; seeds reddish-brown, about 1 mm. long, roughened.



Similar Species:

1. ***Cerastium nutans*** Raf. - Long-stalked Chickweed
   Grows in moist woodlands, in moist calcareous rocky places. Especially common in boreal regions, with isolated populations in the southern Rocky Mountains.
   Differs as follows:
   - Annuals, without basal offshoots.
   - Plants glandular-viscid.
   - Petals little exceeding the sepals.
   - Pedicels reflexed near their tips, the flowers and capsules nodding.
   - Capsules 2-3 times longer than sepals.

2. ***Cerastium vulgatum*** L. - Chickweed
   A common introduced species of waste and disturbed places.
   Distinguished as follows:
   - Plants with viscid-glandular hairs.
   - Leaves oblong-lanceolate, hairy.
   - Plants often purple-tinged.
   - Bracts often scarious-margined.
   - Inflorescence mostly open, sepals 4-6 mm. long, scarious-margined.
   - Petals narrow, about the length of sepals.
   - Capsules 7-12 mm. long, sometimes curved.
   - Seeds wrinkled-papillate.



Habitat & Distribution:

Very common in southern regions, occasional in the boreal forest. A component of most grasslands, but restricted to moister areas and better soils in the prairies.

Forage Value:

Fair, chickweeds as a group moderately nutritious and palatable, but providing little forage, and rated as relatively unimportant range plants.

Grazing Response:

An increaser, the low growth habit well adapted to heavy grazing and trampling; *C. arvense*, along with Kentucky bluegrass and dandelion, is a common component of overgrazed foothills fescue pastures.

Notes:

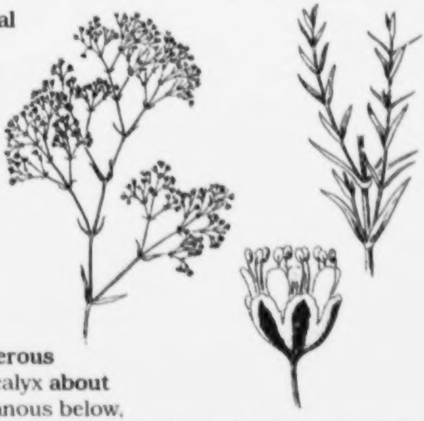
Cerastium, from the Greek *keras*, horn, in reference to the general shape of the capsule. *arvense*, meaning field; field chickweed is a frequent pioneer species on disturbances, and in these situations can be of some value in erosion control while slower growing grasses establish.

GYPSOPHILA L. - Baby's-breath

Common Characteristics

- Annual or perennial herbs with opposite leaves, stipules lacking.
- Flowers small (less than 1 cm. long), in cymes, these often much-spreading.
- Petals exceeding calyx.
- Stamens 10.
- Styles 2.
- Capsules 4 (6)-valved.

Gypsophila paniculata L. - Baby's-breath



Growth Habit: **Hairless, glaucous perennial** from a **deep, thickened taproot**; stems **4-12 dm. tall**, with swollen nodes, **much-spreading branched**.

Blades: Leaves **linear-lanceolate**, 2-10 cm. long, up to 1 cm. broad, entire, 1-nerved, **rather few at maturity**.

Inflorescence: Cymes panicle-like, **large, much-spreading with numerous flowers**, with leafy bracts; calyx **about 2 mm. long**, white-membranous below, purple above on the lobes; petals **white, somewhat exceeding calyx**, about equal to the stamens; capsules ovoid, 4-valved, with 2-5 blackish seeds, these roughened.

Habitat & Distribution: Introduced and fairly common in southern regions, found in disturbed areas.

Forage Value: Poor, the scanty foliage and large panicles unpalatable and contributing little forage; infestations reduce quality and protein content of hay fields and pastures.

Grazing Response: An invader, Eurasian in origin, introduced as an ornamental, particularly popular in florist's arrangements; baby's-breath can be troublesome in drier regions where it is now quite common; because the thick root system can store sufficient food reserves to ensure survival for two years, eradication can be difficult; as well, the species is a prolific seed producer, and the top growth breaks off and behaves as a tumble-weed.

Notes: From the Greek *gypose*, gypsum, and *philos*, friendship, because one species (*G. repens*) prefers gypsum soil; *paniculata*, a reference to the large, spreading panicles.

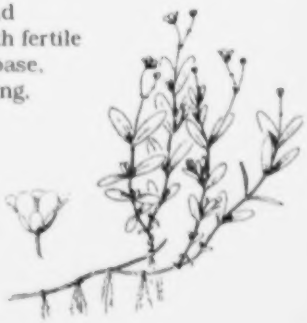
Key to Arenaria

1.	Flowering stems glabrous; inflorescence mostly umbellate and congested; sepals 4-5 mm. long; prairie species.	*A. congesta*
	Flowering stems glandular-hairy above; inflorescence mostly forked and more open; sepals 3-4 mm. long; Rocky Mountain species.	*A. capillaris*

MOEHRINGIA L. - Blunt-leaved Sandwort

Moehringia lateriflora (L.) Fenzl. - Blunt-leaved Sandwort

Growth Habit: Perennials from a branched caudex and slender rhizomes, these producing both fertile and sterile shoots; stems reclining at base, either reclining and rooting or ascending, crisply hairy to nearly glabrous, **5-20 cm. tall**.

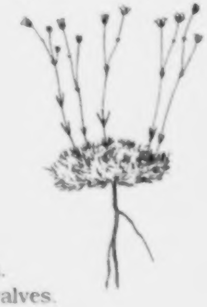


Blades: Leaves rather **thin, opposite, oval to oblong-lanceolate**, obtuse to broadly acute, only the lowest short-stalked, **1-3.5 cm. long**; blades mostly glabrous above, scabrous-pubescent on margins and midribs, sometimes also on lower surface.

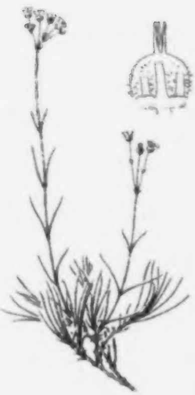
Inflorescence: Flowers 1-5 in axillary and terminal cymes, these with small bracts, on slender pedicels; sepals **2-2.5 mm. long**, obtuse to broadly acute, with white margins, 3-5-nerved, sometimes basally ciliate; **petals white, about twice as long as sepals, entire; styles 3**, the capsules nearly globose, shorter than sepals, **3-valved**, the valves **deeply 2-divided**; seeds rather few, black, glossy, each with a pale, **conspicuous appendage** (strophiole).

Other Species:

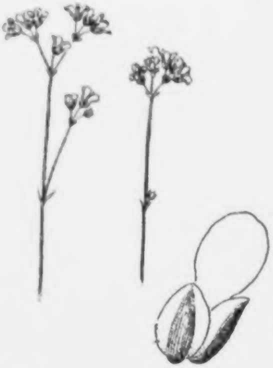
1. ***Minaurtia rubella*** (Wahl.) Graebn. - Sandwort
   Found in dry, open often rocky places from foothills to alpine elevations. The most common member of the genus locally, differing from *Arenaria* by usually having 3 capsule valves. Distinguished as follows:
   - Mat-forming perennials, from slender taproots, plants tufted.
   - Foliage glandular hairy.
   - Leaves opposite, without stipules, 3-ribbed, linear, to 10 mm. long.
   - Flowering stems reclining, 2-18 cm. tall, with 1-7 flowers.
   - Sepals 3 mm. long, sharp-pointed, with 3 conspicuous nerves.
   - Petals white, entire, shorter than sepals.
   - Styles mostly 3, capsules with 3 (to 5) valves.



2. ***Arenaria capillaris*** Poir. var. ***americana*** (Maguire) Davis -Sandwort
Grows in montane meadows and on rocky subalpine slopes. Restricted to the southern Rocky Mountains where common.
Distinguished by:
   - Stems 1-2 dm. tall, glandular-hairy above.
   - Leaves needle-like, mostly basal, more than 1 cm. long.
   - Inflorescence open at maturity.
   - Sepals 3-4 mm. long.
   - Capsule valves 2-cleft.



3. ***Arenaria congesta*** Nutt. var. ***lithophila*** (Rydb.) Maguire - Rocky-ground Sandwort
Restricted to the south where common in dry prairie grassland, on open, often rocky slopes.
Differs from *A. capillaris* as follows:
   - Flowering stems glabrous.
   - Inflorescence more congested.
   - Sepals longer (4-5 mm. long).



Habitat & Distribution: Common, found throughout most ecoregions. Grows in thickets, in moist meadows, on shores, in moist to rather dry mixedwood and deciduous forests.

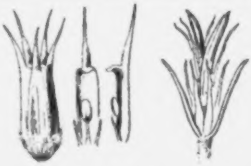
Forage Value: Poor, although somewhat palatable the species is of minimal value to ungulates both because it is unproductive and because it grows below normal grazing level; our small *Arenaria* species are also unproductive, with little or no forage value.

Grazing Response: Increasers, the characteristic low growth habit allowing the species to survive on very heavily utilized range.

Notes: Syn. *Arenaria lateriflora*, the specific name alluding to the broad leaves; in the absence of taller vegetation, blunt-leaved sandwort can form dense and sometimes exclusive mats and in these cases can be of some value as a ground cover species.

PARONYCHIA Mill. - Low Whitlow-wort

Paronychia sessiliflora Nutt. - Low Whitlow-wort



Growth Habit: **Low caespitose perennials with a woody base and taproot, branching from the base and forming mats up to 2 dm. broad**; branches densely crowded, **1-10 cm. tall, spreading, pubescent**.

Blades: **Leaves linear**, **acute**, with two grooves above on either side of midvein, **yellow-green, opposite, imbricate, linear to awl-shaped, 4-6 mm. long**, erect-spreading; lower parts of branches covered with old leaves; **stipules present, silvery-scarious and conspicuous**.

Inflorescence: Flowers terminal, solitary or in pairs, **small**, sessile; **bracts conspicuous, silvery-scarious; petals absent, the sepals 5, linear-oblong, 2-3 mm. long, the calyx lobes much longer than the tube**; sepals concave and awned at the tip, **yellow-green**; stamens 5, alternate 5 linear staminodia (vestigial petals); style 2-cleft; fruit 1-seeded, not opening (urticle), included in the calyx.

Habitat & Distribution: Frequent across southern regions. Grows in dry prairie grassland, especially common on dry hillsides and ridges.

Forage Value: Poor, of no value to grazing animals.

Grazing Response: Increasers.

Notes: The generic name refers to inflammation of the finger, specifically under the nails, the species apparently once used as a supposed cure for this ailment; *sessiliflora* refers to the flowers, sessile and contained within the mat of leaves; although inconspicuous and often overlooked, whitlow-wort has a remarkably tough, woody root system, capable of withstanding considerable trampling and tolerant of droughty exposed sites; in this context it can be of some value for erosion control on steep, dry slopes.

SILENE L. - Catchfly; Campion

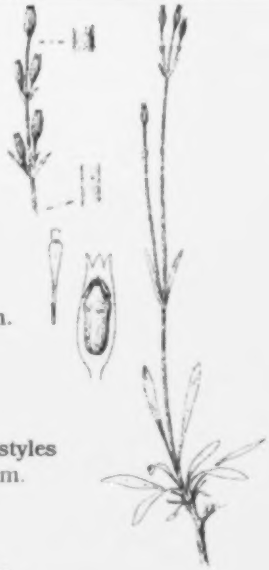
Common Characteristics

- Annuals or perennials with opposite, entire leaves.
- Flowers solitary or in cymes.
- Calyx tubular, with 5 lobes, these many-nerved.
- Petals 5, with a narrow, sometimes auriculate claw.
- Petals 2 or 4-cleft, usually with a scale at the junction of the claw and blade.
- Stamens mostly 10.
- Styles varying from 3 to 5.
- Ovary on a stalk (carpophore).
- Capsules opening by teeth, these equalling or twice the number as styles.
- Seeds globose, roughened.

Key to Silene

1.	Styles 3.	2
	Styles mostly 5, sometimes 4.	5
2.	Calyx glabrous (or lobes somewhat ciliate); introduced.	3
	Calyx with surface pubescent.	4
3.	Calyx with obscure veins, not inflated at maturity, to about 12 mm. long.	*S. cserei*
	Calyx with evident veins and inflated at maturity, 14-20 mm. long.	*S. cucubalus*
4.	Annual, weedy plants, calyx 15-30 mm. long; petal claws at least 12 mm. long.	*S. noctiflora*
	Perennial natives, calyx and petal claws smaller.	*S. menziesii*
5	Stems branched, bushy, lax; calyx less than 1 cm. long; woodland species.	*S. menziesii*
	Stems mostly erect and little branched; calyx over 1 cm. long; of open places.	6
6.	Calyx nerves purplish, calyx often inflated, with lobes over 3 mm. long; petals exserted; often alpine.	*S. parryi*
	Calyx nerves green; calyx not inflated, the lobes to 3 mm. long; petals not much longer than sepals; widespread, at varying elevations.	*S. drummondii*

Silene drummondii Hook. - Drummond's Cockle



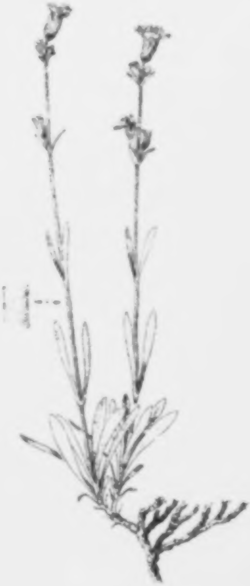
Growth Habit: Perennials from stout vertical roots, stems 1-several, **erect, 2-5 dm. tall, with spreading glandular hairs above (these with purple cross-walls), sticky**.

Blades: Basal blades in rosettes, oblanceolate, stalked, 3-10 cm. long; upper leaves lanceolate to linear, reduced, **glandular-hairy**.

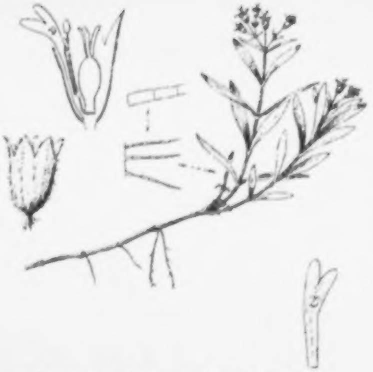
Inflorescence: Flowers few, on stiff, erect glandular stalks; **calyx narrowly tubular, 10-15 mm. long**, somewhat enlarging in fruit, with **10 green nerves, 5-toothed, glandular-hairy; petals white to purplish, barely exserted, blade narrower than the claw, the apex retuse to shallowly 2 (4)-lobed; styles 3**; capsules narrowly oblong, about 10 mm. long; seeds dark brown, 0.7 mm. long, rugose-roughened.

Similar Species:

1. ***Silene parryi*** (S. Wats.) C.L. Hitchc. & Maguire - Cockle
   Similar to *S. drummondii*, replacing it at higher elevations, mostly confined to the southern Rocky Mountains. Often a component of alpine/subalpine grasslands.
   Differs as follows:
   - Calyx larger, 11-16 mm. long, inflated at maturity, the lobes over 3 mm. long, the nerves purplish.
   - Petals distinctly exserted, white to greenish or purplish.
   - Pubescence on inflorescence more inclined to be purplish.



2. ***Silene menziesii*** Hook. ssp. ***menziesii*** - Menzies Catchfly
Frequent in southern regions, found in wooded areas, in clearings.
Differs as follows:
   - Small plants, 1-3 dm. tall.
   - Stems lax, bushy-branched.
   - Stems and calyx glandular-hairy.
   - Leaves lanceolate to oblanceolate, 2-5 cm. long, hairy and margins ciliate.
   - Calyx 5-8 mm. long, petals white, 2-cleft, less than 10 mm. long.



Habitat & Distribution: Occasional and very widespread. Found on dry, open slopes, in prairie grassland, in sandy soil.

Forage Value: Poor, this rating given as a generalization for most members of the genus.

Grazing Response: Increasers, but unlike their introduced relatives, our native species are not problematic under normal conditions.

Notes: The name *Silene* is thought to originate with Theophrastus, who used the Greek *sialon*, saliva, a supposed reference to the sticky stems of some species; the pink family contains some 2000 species, these variously treated by taxonomists whose opinions vary concerning the rather vague lines of demarcation separating some genera from others; a number of species are of economic importance, many cultivated ornamentals (including our familiar carnation), others such as bladder campion (*S. cucubalus*), night-flowering catchfly (*S. noctiflora*) and *S. cserei* classed as noxious weeds.

STELLARIA L. - Chickweed; Starwort

Common Characteristics

- Annual or perennial herbs, tufted or producing rhizomes and mat forming.
- Blades sessile (or lowest stalked), ovate to linear, without stipules.
- Stems often 4-angled.
- Flowers few to several, in cymes.
- Sepals and petals each 5 (petals absent in a few species).
- Petals distinctly 2-lobed, white.
- Stamens usually 10, hypogynous; styles 3.
- Capsules ovate-cylindric, 1-loculed, opening by 6 valves.
- Seeds reticulate to tuberculate.

Key to Stellaria

1. Bracts of inflorescence never pale-scarious. 2

Bracts of inflorescence from scarious to greenish. 4

2. Stems distinctly angled; leaves broad, 1-4 cm. long, elliptic-ovate/lanceolate, ciliate at the base; petals absent or very short. *S. calycantha*

Stems not obviously angled; leaves, if ovate, less than 2 cm. long, without basal ciliation; petals at least as long as sepals. 3

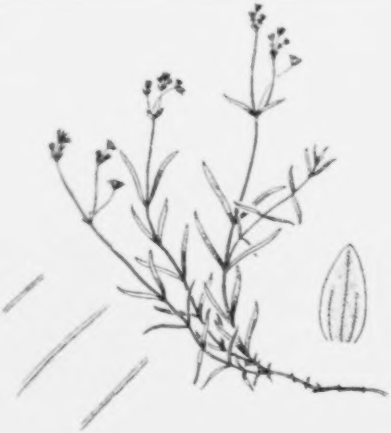
3. Leaves firm, keeled, linear-lanceolate, broader below middle, often blue-green; stems erect-ascending. *S. longipes*

Leaves lax and soft, fleshy, green, elliptic-lanceolate; stems reclining-matted. *S. crassifolia*

4. Leaves linear-lanceolate, broader below middle; blades erect, keeled, margins smooth, glabrous, firm, blue-green; flower stalks erect-ascending. *S. longipes*

Leaves linear, both ends acute, spreading to ascending, not strongly keeled, margins scabrous, often with a few basal hairs, bright green; flower stalks wide-spreading. *S. longifolia*

Stellaria longifolia Muhl. - Long-leaved Chickweed



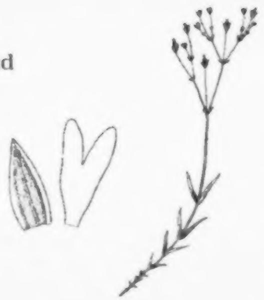
Growth Habit: Perennials spreading by rhizomes; stems **reclining to ascending**, slender, 1-5 dm. tall, **distinctly 4-angled**, glabrous but **minutely scabrous above**.

Blades: Blades **linear**, 2-5 cm. long, **narrowed at both ends**, **bright green**, opposite, sessile, **not strongly keeled**, **glabrous or with a few marginal cilia at base**; margins **scabrous under 10-power lens; spreading, not stiff and erect**.

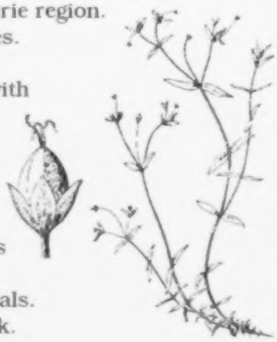
Inflorescence: Cymes several-flowered, **with scarious bracts**; pedicels slender, **spreading to reflexed**; sepals 3-4 mm. long, glabrous, scarious-margined, acute; petals **2-cleft**, usually somewhat exceeding sepals; capsules greenish-yellow, usually exserted; seeds appearing smooth but reticulate under magnification.

Similar Species:

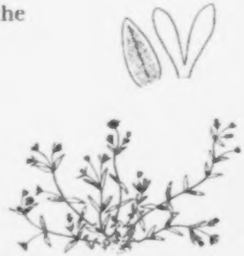
1. ***Stellaria longipes*** Goldie - Long-stalked Chickweed
   Similar in distribution patterns, found in open woods, moist grassland, on open montane slopes.
   Differs as follows:
   - Stems not roughened.
   - Foliage blue-green, glaucous.
   - Blades broader at the base, erect, firm, keeled on the back, margins smooth.



2. ***Stellaria calycantha*** (Ledeb.) Bong. - Chickweed
   Found in all areas except the dry prairie region. Grows in moist, usually shaded places.
   Distinguished as follows:
   - Rhizomatous, reclining species with angled, remotely hairy stems 1-4 dm. long.
   - Leaves elliptic-ovate/lanceolate, ciliate at the base, thin, 1-4 cm. long.
   - Flowers on reflexed stalks, sepals 2-4 mm. long, pale-margined.
   - Petals absent or shorter than sepals.
   - Capsules longer than sepals, dark.
   - Seeds inconspicuously textured.



3. ***Stellaria crassifolia*** Ehrh. - Chickweed
   Also frequent and widespread and occasionally occurs on suitable sites in the prairie region. Found in wet places.
   Distinguished as follows:
   - Matted, branching, diffuse species, essentially glabrous.
   - Leaves lax and soft, elliptic-lanceolate, 5-15 mm. long, green, fleshy.
   - Flowers few-several, in cymes.
   - Sepals 2-4 mm. long.
   - Petals mostly evident, longer than sepals.
   - Capsules longer than sepals.
   - Seeds roughened-rugose.



Habitat & Distribution: Common in most areas. Absent from the drier prairie region. Found in moist areas: in moist woods, on shores, around sloughs, in depressional areas, and a frequent component of fens.

Forage Value: Poor to fair for the genus, generally nutritious and palatable but producing very little forage.

Grazing Response: Increasers.

Notes: *Stellaria* means star, for the appearance of the flowers, the specific name a reference to the long narrow leaves; the term chickweed implies a fondness of seed-eating birds for the seeds; chickweed is nutritious, and was at one time a common salad green and pot herb; medicinal properties are varied, the plants a general anti-inflammatory for internal ailments, and applied externally for a number of skin conditions; root decoctions act as a tonic, diuretic and laxative, and in recent years chickweed has been a component of various weight loss formulas.

RANUNCULACEAE - Crowfoot Family

Common Characteristics

- Annual or perennial herbs, rarely woody vines.
- Leaves variously positioned, simple to compound, without stipules.
- Flowers with or without petals, usually perfect.
- Petals and sepals each 3-20, usually 5-10, not united.
- Stamens usually numerous.
- Fruit an achene or follicle, rarely a fleshy berry.

Key to Ranunculaceae

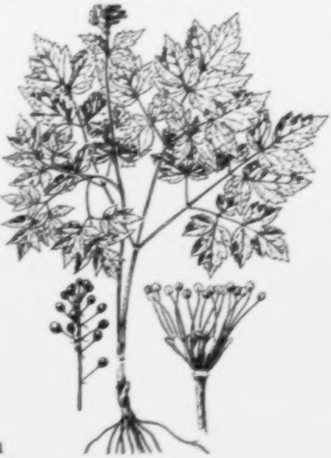
1.	Plants with woody climbing stems; leaves opposite.	*Clematis*
	Plants without above combination of characteristics.	2
2.	Flowers irregular, blue-purple.	*Delphinium*
	Flowers regular.	3
3.	Flowers with evident spurs.	*Aquilegia*
	Flowers without spurs.	4
4.	Carpel 1; fruit a red or white berry.	*Actaea*
	Carpels more than 1; fruit dry.	5
5.	Ovaries 1-ovuled; fruit an indehiscent achene.	7
	Ovaries with more than one ovule; fruit of follicles.	6
6.	Leaves toothed to entire; petals yellow or whitish; distribution variable.	*Caltha*
	Leaves divided palmately; sepals white; Rocky Mountains.	*Trollius*
7.	Petals mostly present, yellow.	*Ranunculus*
	Petals absent.	8

8. Cauline leaves whorled to form a conspicuous involucre; flowers perfect; sepals colored, petal-like. *Anemone*

Involucre whorls lacking, cauline leaves alternate; flowers usually imperfect; sepals not petal-like, small, greenish. *Thalictrum*

ACTAEA L. - Baneberry

Actaea rubra (Ait.) Willd. - Red and White Baneberry



Growth Habit: Perennial herbs from thick fibrous roots; stems **robust**, sparsely hairy, several arising together, branched above, **3-8 dm. tall**.

Blades: Lower scale-like, **upper ones large, 2-3 times ternate, long-stalked**, the **segments ovate, sharply toothed, 2-9 cm. long**, bright green above, paler below, hairs (if any) restricted to veins below.

Inflorescence: Racemes **somewhat compact**, short, terminal and axillary, **on naked stalks**; sepals **white, perianth about 2-3 mm. long**, early deciduous; carpel 1, stamens many; fruit a **several-seeded nearly spherical berry 5-9 mm. long, white or red at maturity**.

Habitat & Distribution: Common throughout most areas, absent from the dry prairie region. Found in forested regions, in mixed woods, aspen forests, on wooded stream banks, in moist ravines and coulees. An indicator of rich, mixed or deciduous woodlands.

Forage Value: Poor, containing the toxic substance protoanemonin, and although known primarily for its effects on humans, the species is at least somewhat poisonous to livestock (the fruit also avoided by birds); as with many other members of the buttercup family, baneberry is unpalatable and will not be grazed under normal conditions.

Grazing Response: An increaser.

Notes: The generic name *Actaea* is derived from the Greek *aktiai*, meaning elder, to which the leaves bear resemblance; *rubra* alluding to the red berries; although poisonous (the berries especially toxic) and capable of causing respiratory failure, baneberry tea was sometimes used by native people, taken internally for medicinal purposes, and poultices made and applied to wounds; however, human use of this or any potentially harmful plant is not advised.

ANEMONE L. - Anemone

Common Characteristics

- Perennial herbs, usually from a single to multiple caudex, or occasionally rhizomatous.
- Blades mostly palmately divided, both basal and cauline in the form of whorled involucre leaves.
- Petals absent, sepals 5 or more, conspicuous, petal-like.
- Flowers perfect.
- Fruit of achenes.

Key to Anemone

1. Sepals 2-4 cm. long; styles at maturity long-plumose, to 4 cm. long. 2

   Sepals usually to 2 cm. long; styles not plumose, short. 3

2. Flowers white (blue-tinged); subalpine/alpine. *A. occidentalis*

   Flowers purplish-blue; widespread at lower elevations. *A. patens*

3. Involucre leaves stalked; fruiting head cylindrical. *A. cylindrica*

   Involucre leaves sessile. 4

4. Leaves 1-3 cm. broad, trifoliate, the final segments wedge-shaped; sepals white to blue-tinged. *A. parviflora*

   Leaves with more numerous divisions. 5

5. Leaf divisions relatively broad, (mostly more than 5 mm. wide), broad-lanceolate to wedge-shaped; flowers white; achenes mostly glabrous. *A. canadensis*

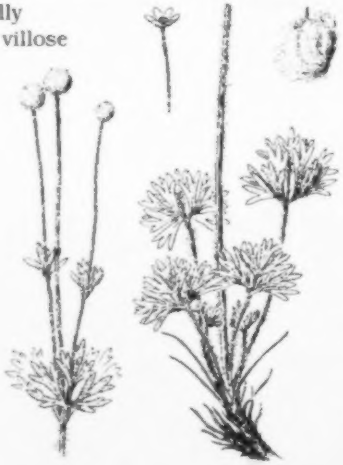
   Leaf divisions usually narrower; flowers white, yellowish, blue or pink-red; achenes hairy. 6

6. Plants 2-5 dm. tall, with several flowers, these white to yellowish to pink-purple; lowland to subalpine. *A. multifida*

   Plants 1-2 dm. tall, mostly with a single bluish flower; montane to alpine. *A. lithophila*

Anemone multifida Poir. - Cut-leaved Anemone

Growth Habit: Plants with a stout, simple or usually branched caudex; stems 1-several, villose to nearly glabrous, **1.5-5 dm. tall**.

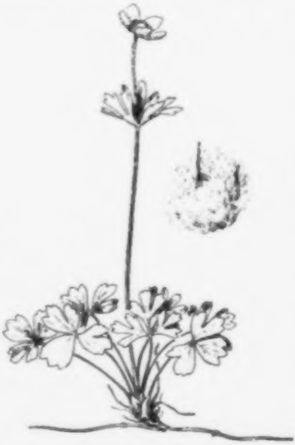


Blades: Basal leaves several, 2-10 cm. broad, long-petioled, **2-3 ternate, the ultimate segments relatively narrow, pointed, linear-oblong, 1.5-4 mm. broad**; veins **often depressed above, prominent-protruding below**; densely villose to nearly glabrous; involucre leaves similar, sessile, usually 3; secondary involucres, when present, above the primary ones, reduced; **margins of leaf segments entire**.

Inflorescence: Flowering peduncles **1-several**; sepals 5-9, 7-14 mm. long, ranging from **white through pink, red-purple, yellow**, pubescent externally; seed heads **globose-ovoid**, to 1 cm. wide; achenes **pubescent**, with styles 1-1.5 mm. long, stout and thickened at base, often reddish, glabrous.

Similar Species:

1. ***Anemone parviflora*** Michx. - Anemone
   Common in the southern Rocky Mountains, from lowland to alpine elevations. Found on moist, often calcareous banks and ledges, along streams, in seepage areas.
   Differs as follows:
   - Plants smaller (1-3 dm. tall), from rhizomes.
   - Blades trifoliate, the segments wedge-shaped and obovate.
   - Blades crenately lobed into broad, obtuse divisions.
   - Peduncle solitary, 1-flowered.
   - Sepals white, often tinged with purple.



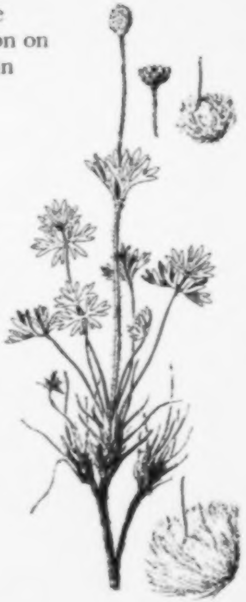
Note: An unrelated species, but with leaves superficially resembling those of *A. parviflora* is *Adoxa moschatelliana* L. (Moschatel), found in boreal and central foothills regions in moist/boggy woods; flowers are greenish, very small, in a terminal, often 4-sided cluster; fruit is a tiny dry greenish drupe.

2. ***Anemone lithophila*** Rydb. - Anemone

A Rocky Mountain species, most common on subalpine/alpine slopes, but also found in montane areas.

Distinguished from *A. multifida*:

- Plants smaller, to 2 dm. tall.
- Flowers mostly 1 per plant.
- Sepals pale blue.
- Styles on achenes longer, 4-6 mm.



Habitat Distribution: Common throughout most regions. Found in fescue grassland, drier (mesic-subxeric) montane sites, open meadows and woods, moister areas in the prairies.

Forage Value: Poor, as with all members of the genus, unpalatable throughout the growing season, also somewhat toxic due to the presence of protoanemonin in the foliage.

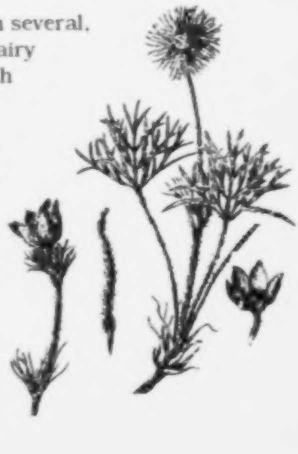
Grazing Response: An increaser, and in some cases an indicator of overgrazing; *A. parviflora*, much less aggressive in spite of its rhizomatous growth habit, forms colonies in moist shaded areas but does not compete on densely vegetated sites.

Notes: *Multifida* translates many-cleft, in reference to the leaf divisions; also known as wind flower because of the air-borne achenes; all three species are delicately beautiful when in bloom. *A. multifida* with a wide range of color variations, also adapted to extremely variable habitats and climatic conditions; for this reason it is recognized as a valuable pioneer species in early successional vegetation communities.

Anemone patens L. - Prairie Crocus; Pasque Flower

Growth Habit: Plants from a thick caudex; stems often several, **1-4 dm. tall**, sparsely to densely long-hairy **with spreading hairs**, bases clothed with old brownish leaves and sheaths.

Blades: **Basal blades** several, **long-stalked**, not appearing until after emergence of first flowers; blades **3 times divided**, the **central segment 3-cleft**, the lateral ones tending to be **2-cleft**; divisions **again cleft into mostly linear, pointed segments 1-2 (3) mm. wide; veins depressed above, protruding below, the margins minutely toothed**, sparsely to densely spreading-hairy

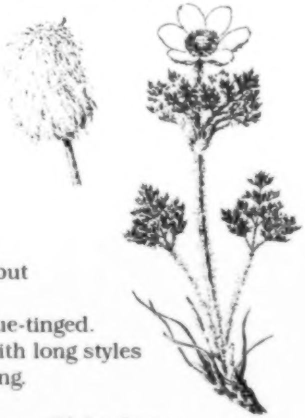


on both surfaces and on stalks; involucre leaves similar but **sessile**, and conspicuously spreading-hairy toward base.

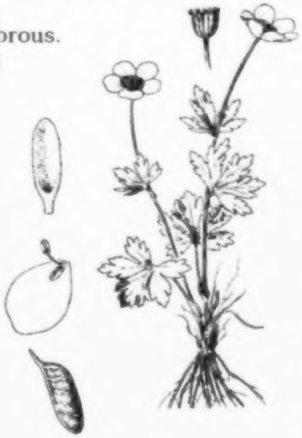
Inflorescence: Flowers **solitary**, the sepals **pale blue to purple, 5-7, 2.5-4 cm. long**, hairy on the back; achenes numerous, **silky-hairy**, to 3 mm. long, **with persistent styles, these becoming feathery and 2-4 cm. long in fruit**; seed heads globose.

Similar Species:

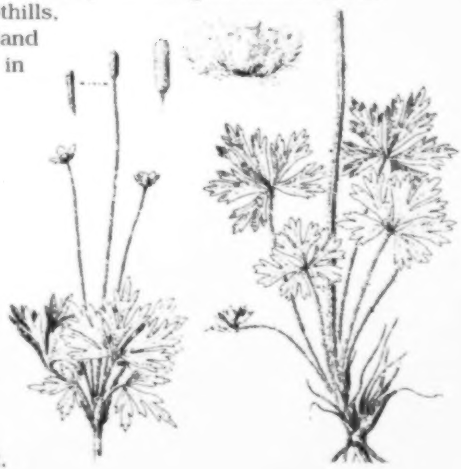
1. ***Anemone occidentalis*** S. Wats. - Chalice Flower
   Common in moist meadows at higher elevations.
   Differs from *A. patens* as follows:
   - Plants 1-6 dm. tall, pubescent, especially when immature.
   - Basal blades 3-divided, then many times divided into narrow segments.
   - Involucre leaves 3, similar to but smaller than basal.
   - Sepals to 3 cm. long, white/blue-tinged.
   - Achenes becoming reflexed, with long styles 2-4 cm. long; seed heads oblong.



2. ***Trollius albiflorus*** (A. Gray) Rydb. - Globe-flower
   Also common in moist subalpine/alpine areas.
   Distinguished as follows:
   - Plants 2-4 dm. tall, mostly glabrous.
   - Leaves 5-7 parted into toothed obovate segments.
   - Blades 2-4 cm. wide, the lowest stalked.
   - Flowers large (to 4 cm. wide), with 5-7 large whitish sepals and small inconspicuous petals.
   - Stamens many.
   - Fruit of 10-20 follicles, each with a beak, several seeds; follicles to 1 cm. long.



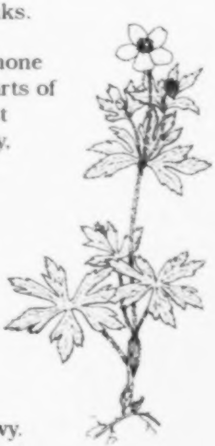
3. ***Anemone cylindrica*** A. Gray - Long-fruited Anemone



Common in the foothills, montane and parkland regions, occasional in the boreal forest. Found in open fescue grassland, in dry, open woods, on slopes. Replaced by *A. multifida* on poor soils. Distinguishing characteristics:

- Blades several times parted, the final divisions not deeply cleft, oblong and wedge-shaped at the base.
- Involucre leaves long-stalked.
- Flowers greenish-white, 8-12 mm. long, hairy on the outside.
- Seed heads cylindrical.
- Achenes woolly with short hairless beaks.

4. ***Anemone canadensis*** L. - Canada Anemone



Common in all regions except the driest parts of the prairies, where restricted to a few moist localities. Grows in fescue grassland, in dry, open woods, on open slopes. Distinguished as follows:

- Rhizomes present.
- Basal blades deeply 3-5 divided and again 3-parted and toothed, the segments broad (>5 mm. wide).
- Blades green, scarcely paler below.
- Involucre stalkless.
- Flowers solitary, each with a leafy involucre below.
- Sepals large (1-2 cm. long), white, showy.
- Seed heads rounded, hairless, with short hairless beaks.

Habitat & Distribution: Common across the south, restricted to open grasslands in the boreal forest. Found in fescue grassland, and on deeper soils in the prairie region, on well drained (sometimes sandy) soils, in dry open woods in montane areas.

Forage Value: Poor, nutritionally inferior to most range grasses, and in most cases provides relatively little forage, and this is unpalatable for most of the growing season; by mid-summer foliage is usually desiccated, although late-season moisture can sometimes stimulate fall growth and flowering; the species is listed as mildly toxic due to its protoanemonin content, but because palatability is low, actual cases of poisoning are rare; sheep have been poisoned by eating the flowers of young plants; *A. patens* apparently can cause the formation of "hair balls" when seed heads are ingested by sheep.

Grazing Response: An increaser, and indicator of heavy grazing.

Notes: From the Greek *anemos*, wind, possibly a reference to the wind-dispersed seeds; *patens* means spreading, alluding to both the plant's spreading growth habit, and the tendency of sepals to open in bright sunlight; also known as pasque flower, old man, and prairie smoke, the two latter names because of the feathery seed heads; a toxic species, *A. patens* nevertheless had some traditional medicinal value, a poultice of crushed leaves applied as a counter-irritant; taken internally, it caused vomiting, purging, tremors and collapse, but was sometimes consumed in small quantities for its supposed aphrodisiac properties; prairie crocus has some value both as an ornamental and reclamation species, although propagation except by hand or transplanting is difficult and this remains a deterrent to development of commercial quantities of seed.

AQUILEGIA L. - Columbine

Common Characteristics

- Perennials from caudex-like rhizomes.
- Leaves compound.
- Flowers conspicuous, regular.
- Petals 5, the blade expanded backward into a nectar-producing spur.
- Stamens numerous, the inner staminodial.
- Carpels 5, erect, styles 5.
- Fruit of 5 follicles.
- Seeds black.

Key to Aquilegia

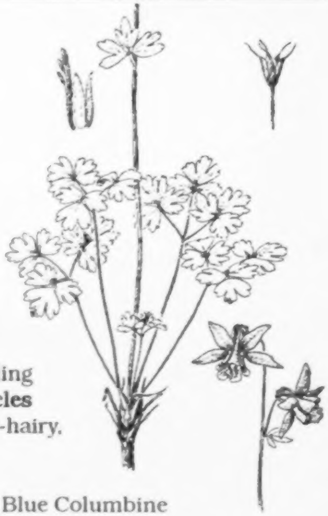
1. Small plants to 0.8 dm. tall; stems slender, sparingly branched; sepals blue; follicle beaks 2-5 mm. long; widespread distribution. *A. brevistyla*

Taller, more branched plants 2-7.5 dm. tall; sepals yellow or pink-tinged; follicle beaks over 5 mm. long; foothills/montane species. *A. flavescens*

Aquilegia flavescens S. Wats. - Yellow Columbine

Growth Habit: **Branched plants 2-7.5 dm. tall.**

Blades: Foliage from glabrous to glandular and/or hairy; basal blades long stalked, **bi/triternate, the leaflets again cleft and toothed**.



Inflorescence: **Sepals yellowish, spreading to reflexed**, longer than petal blades; **flowers yellow**, sometimes pink-tinged, **with spurs 10-15 mm. long, about as long as petal blades, spurs at least somewhat incurved**, knobbed at the tips; stamens exceeding petals, conspicuously exserted; **follicles about 2 cm. long**, hairy or glandular-hairy, **with beaks over 5 mm. long**.

Similar Species:

1. ***Aquilegia brevistyla*** Hook. - Blue Columbine
   Occasional, rather widely distributed, absent from southern foothills, montane and also the prairie regions. Found in open woods, in rock crevices.
   Distinguished as follows:
   - Smaller plants, to 80 cm. tall, slender, less branched.
   - Plants glandular-hairy above.
   - Basal blades biternate, the leaflets lobed and crenate, long-stalked.
   - Cauline blades subsessile, rather few, lobed.
   - Flowers several, 1.5-2.5 cm. long.
   - Sepals blue-purple.
   - Petals yellow-white, the blades about as long as sepals.
   - Spurs blue, 6-8 mm. long, hooked.
   - Stamens and styles about as long as petals.
   - Follicles 2-2.5 cm. long, hairy, with beaks 2-5 mm. long.

Habitat & Distribution: Common in the southern Rocky Mountains, from montane to alpine elevations. Found in rocky places, in open woods, on slopes.

Forage Value: Poor to fair; compared to many forbs, columbines are large and leafy, and thus produce considerable amounts of forage when abundant, but palatability is generally rated below that of most range grasses, and utilization of the plants to any extent is an indication of depleted forage supplies; unlike some European species that cause symptoms similar to those of aconite poisoning, our columbines are apparently not toxic.

Grazing Response: Increasers #1, the plants sensitive to heavy and continuous utilization, evident on pastures overgrazed by domestic livestock as well as occasionally on sheep range at higher elevations.

Notes: The generic name supposedly originates with *aqua*, water, and *ligere*, collected, in reference to the nectar at the tips of the spurs; the specific name means to make yellow; about 70 species globally, many of them widely cultivated; traditional human uses of the genus have been listed, in spite of the toxic properties of some species: the foliage can be boiled and eaten, root teas taken for diarrhea, poultices applied to aching joints, and various decoctions used because of their astringent properties; columbines rate among our most beautiful native plants, *A. flavescens* producing hybrids with the more rare *A. formosa* when their ranges meet; the more common species respond well under cultivated conditions, rare species, much more site specific and less successful competitors, are best left undisturbed.

CALTHA L. - Marsh Marigold

Common Characteristics

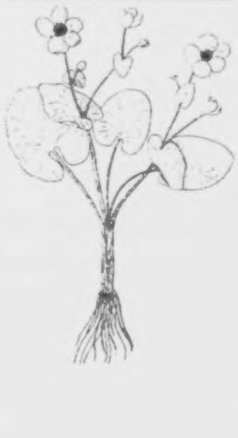
- Perennial herbs of wet habitats.
- Blades simple, usually mostly basal.
- Petals absent.
- Sepals petal-like, 5-9.
- Fruit a sessile several-seeded follicle, this splitting above.

Key to Caltha

1. Stems floating or creeping, slender; leaves up to 3 cm. broad; flowers white, to 1 cm. broad; carpels about 30. *C. natans*

Stems reclining to ascending; leaves to 1.5 dm. broad; flowers larger, yellow; carpels 6-12. *C. palustris*

Caltha palustris L. ssp. ***palustris*** - Marsh Marigold



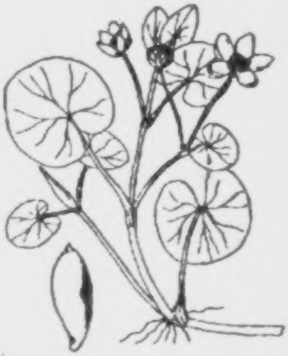
Growth Habit: Plants from a **coarse fleshy** fibrous **root system**; stems floating, or reclining and ascending, **rooting at the nodes**, hollow, 2-6 dm. long, smooth, branching above.

Blades: Basal blades **long-stalked**, **circular-reniform** and **cordate-based**, often large, to **1.5 dm. broad**, the margins from nearly **entire to toothed**, smooth; cauline blades **similar**, several, **reduced upward**, nearly stalkless.

Inflorescence: Flowers several, **with stout stalks, yellow, 1.5-4 cm.** wide; follicles 10-15 mm. long, curved and with curved beaks; follicles 6-12.

Similar Species:

1. ***Caltha natans*** Pallas -Floating Marsh Marigold
   Common in boreal regions.
   Primarily an aquatic species, but also found on shores, the stems rooting at the nodes and creeping in mud or sand.
   Differs as follows:
   - Stems more slender, either floating or reclining-creeping on wet shores.
   - Blades similar in shape but much smaller, up to 3 cm. broad.
   - Flowers white to pinkish, smaller, to 1 cm. broad.
   - Carpels (and follicles) more numerous, about 30.



Habitat & Distribution: Found predominantly in the boreal forest. Grows in swampy areas, marshes, wet woods, often in shallow, slow moving water.

Forage Value: Poor, rated as worthless as a range species, the foliage acrid and unpalatable to livestock; like many members of the buttercup family, marsh marigold contains anemonin, making it somewhat toxic, especially at maturity, but can be safely fed in hay due to volatility of the poisonous principle.

Grazing Response: An increaser.

Notes: *Caltha*, a Greek name for a yellow flower, although probably a member of another genus, *palustris* means marshy; the common name comes from Mary's Gold, a medieval name for a daisy sacred to the Virgin Mary; marsh marigold is an attractive species, recommended as an ornamental, also to stabilize and bind wet soil around ponds and wetlands.

CLEMATIS L. - Virgin's-bower; Clematis

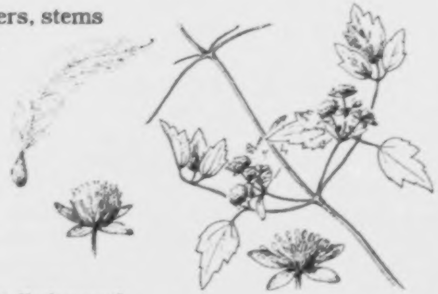
Common Characteristics

- Stems slender, at least partially woody, climbing by means of leaf petioles.
- Leaves opposite, 3-7 divided, the divisions entire to coarsely serrate-lobed.
- Leaf petioles twisted and clasping supporting vegetation.
- Flowers paniculate or solitary, perfect or imperfect.
- Petals absent; sepals 4, petal-like.
- Stamens numerous, the outer sometimes sterile enlarged staminodia.
- Carpels numerous, becoming achenes with long, plumose, persistent styles.

Key to Clematis

1.	Flowers solitary, blue-purple; leaflets in 3's; widespread.	*C. occidentalis*
	Flowers in clusters, white; leaflets 5-7; prairie species.	*C. ligusticifolia*

Clematis ligusticifolia Nutt. - Western Clematis



Growth Habit: Strong **semi-woody climbers, stems 3-10 (15) m. long**, ridged, from nearly glabrous to villose, especially on new growth.

Blades: **Leaves pinnate, with 5-7 stalked leaflets**, these ovate-lanceolate, nearly entire to coarsely toothed, glabrous to sparsely pubescent, especially beneath.

Inflorescence: Flowers **few to many** in bracteate panicles, usually dioecious; **sepals white**, pubescent, 8-12 mm. long; staminate flowers lacking pistils but pistillate flowers with numerous sterile stamens; achenes pubescent, **with persistent plumose styles 2.5-5 cm. long**.

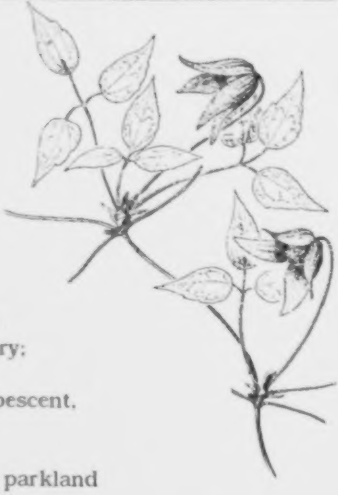
Habitat & Distribution: Common in southern regions. Found in wooded areas, especially in ravines, coulees, in river valleys. Frequently forming dense matted growths over trees and shrubs.

Forage Value: Poor to fair, any significant use of the species usually a response to a shortage of more palatable forage, also sometimes consumed along with the shrubby species with which it associates.

Grazing Response: Increasers.

Notes: The specific name originates with Nuttall who compared the foliage with that of an unrelated species; western clematis was apparently used by native people for a number of purposes, the bark effective in treating fever, decoctions of leaves taken for colds and sore throats, and roots given to horses to inhale as a stimulant, with supposed miraculous effects; *C. ligusticifolia* is an aggressive climber, occasionally causing damage to supporting vegetation, particularly when other factors such as severe browsing have weakened the plants; it is sometimes planted on trellises as an indigenous alternative to our familiar non-native clematises.

Clematis occidentalis (Hornem.) DC. var. ***grosseserrata*** (Rydb.) Pringle - Purple Clematis



Growth Habit: Perennials, stems **woody, trailing and somewhat creeping, to 2 m. long**, hairy (especially on new growth) to nearly glabrous.

Blades: Leaflets **3**, long-petioled, ovate-lanceolate, thin, mostly entire, occasionally sharply toothed, often sparsely hirsute below; **leaf petioles twisted, climbing.**

Inflorescence: Flowers mostly perfect, **solitary**, on long peduncles, terminal and axillary; sepals **blue-purple, 3-5 cm. long, acuminate**, pubescent, achenes pubescent, **with plumose styles 3-6 cm. long.**

Habitat & Distribution: Common in foothills, montane and parkland regions, also in Cypress Hills. Found in open woods, coniferous forests, on rocky (often calcareous) slopes.

Forage Value: Poor to fair, most often utilized only in the absence of better quality forage.

Grazing Response: Increasers, but much less aggressive than western clematis, rarely found in any abundance.

Notes: Syn. *C. verticellaris*; the generic name is derived from the Greek *klema*, tendril, the specific name refers to western distribution; the Blackfoot term for clematis is sto-o-kat-sis, or ghost's lariat, as clematis species can creep across the ground, and apparently were responsible for tripping an occasional unobservant hiker; *C. occidentalis* is one of our most photogenic woodland plants, also prized as an ornamental in wild shaded gardens.

DELPHINIUM L. - Larkspur

Common Characteristics

- Perennials from stout fibrous or fleshy-tuberous roots.
- Stems often hollow.
- Leaves more or less palmately 3-5 divided, usually again lobed.
- Flowers in terminal racemes, irregular, blue-purple.
- Sepals 5, blue-purple, the upper extended backward into a spur.
- Petals 4, unequal: upper pair lanceolate, prolonged into a spur within calyx spur; lower two with basal claws, and top enlarged-ovate to round.
- Fruit a many-seeded follicle.
- Seeds usually angular and with winged angles, black.

Key to Delphinium

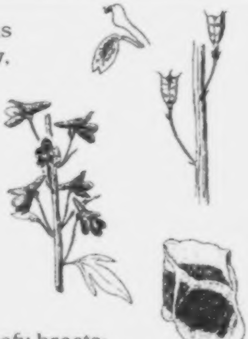
1. Stems hollow, 6-20 dm. tall; flowers numerous, in racemes at least 15 cm. long. *D. glaucum*

   Stems solid or mostly so, mostly less than 6 dm. tall; flowers1-15, in racemes less than 15 cm. long. 2

2. Roots thick, tuber-like; leaves both basal and cauline; lower petals white-pale blue, with notches over 1/5 blade length. *D. nuttallianum*

   Roots fleshy but not tuber-like; blades mostly basal; lower petals deep blue, with notches less than 1/5 blade length. *D. bicolor*

Delphinium glaucum S. Wats. - Tall Larkspur



Growth Habit: Plants from **thick, tough, woody roots**; stems usually several, 6-20 dm. tall, ridged, **hollow**, hairless and **usually glaucous**.

Blades: Numerous, basal and cauline, often finely hairy, more densely so below, **palmately 5 (7) divided** to 4/5 their length into **broadly wedge-shaped segments**, and again sharply toothed; lower **12-18 cm. broad**, reduced upward.

Inflorescence: Racemes **elongate, more than 15 cm. long**, loosely many flowered, lower flowers with leafy bracts; **sepals and petals blue-purple; sepals 5, the upper one extended into a spur, 6-12 mm. long**, finely hairy externally, lower and lateral ones somewhat larger than upper; petals **4, unequal, the lower 2 with top enlarged and rounded**; upper petals white-margined, prolonged into calyx spur; follicles 10-14 mm. long, hairless or hairy.

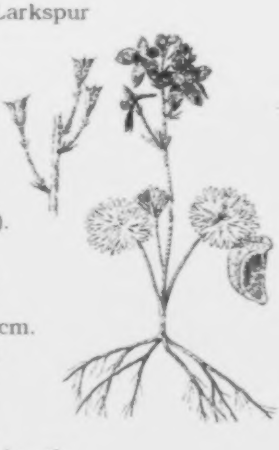
Similar Species:

1. ***Delphinium bicolor*** Nutt. - Low Larkspur

   Common in southern foothills and montane areas, Cypress Hills. Often found in open woods, on rocky montane slopes; in drier regions restricted to snow catch areas, ravines.

   Differs as follows:

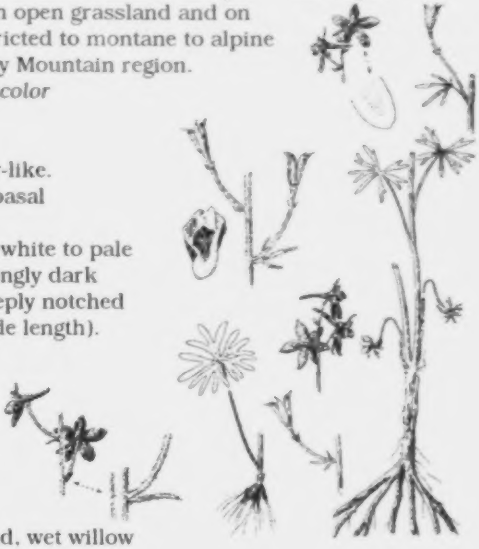
   - Roots fleshy (but not tuber-like).
   - Stems lower (2-5 dm. tall).
   - Stems not hollow, often yellow-glandular above.
   - Blades firm, mostly basal, to 6 cm. wide, palmately divided several times into narrow segments.
   - Flowers few, in short racemes.
   - Lower petals pale to deep blue, notched less than 1/5 the blade length.



2. ***Delphinium nuttallianum*** Pritz. *ex* Walp. - Larkspur

A species found in open grassland and on open slopes, restricted to montane to alpine areas in the Rocky Mountain region. Differs from *D. bicolor* as follows:

- Roots often thicker, tuber-like.
- Leaves both basal and cauline.
- Lower petals white to pale blue and strongly dark pencilled, deeply notched (over 1/5 blade length).



Habitat & Distribution: Common in the foothills, montane and boreal forest ecoregions. Found in moist montane meadows, depressional grassland, wet willow thickets, in aspen and mixed woods, on stream banks. An indicator in forested regions of rich, deciduous-dominated sites. In montane to alpine areas, found in open grassland, and again an indicator of some range types in these ecoregions.

Forage Value: Poor, the entire plant containing alkaloids, the most common of these delphinine, making it highly poisonous to all classes of livestock; seeds are especially toxic, and cattle seem most affected; larkspur species are the only poisonous plants that are palatable under normal conditions, and chemical analysis actually shows a high protein content in the spring; losses to low larkspur occur primarily in the spring, the species greening-up early, and withering and unattractive by mid-summer; one exception is when the plants occur in ravines that remain lush longer than upland sites, and in these cases the species, along with associated vegetation, is heavily utilized; tall larkspur remains succulent and palatable until late in the season (although flower stalks are less often eaten) and can cause losses in late summer if drought or overgrazing depletes forage supplies; grazing in infested pastures should be delayed until mid-summer when plenty of alternative forage is available. *Note*: The similar *Aconitum delphinifolium* DC., monkshood (upper sepal not spurred but helmet shaped), is locally abundant in some montane to alpine regions, and is equally as poisonous.

Grazing Response: Increasers.

Notes: From the Greek *Delphinion*, meaning dolphin, parts of the flower structure supposedly resembling a dolphin, *glaucum* referring to the characteristic blue-green foliage; larkspurs are also poisonous to humans, lethal doses resulting in respiratory paralysis; native larkspurs can be successfully grown as ornamentals, and are an attractive addition in wild flower mixes used in reclamation, although care must be taken to avoid seeding the species in areas utilized by livestock; in some isolated montane areas naturalized populations of *D. glaucum* with pale blue flowers occur and are suspected hybrids between the native and a non-native species.

RANUNCULUS L. - Buttercup; Crowfoot

Common Characteristics

- Aquatic or terrestrial mostly perennial herbs with fibrous or fleshy roots.
- Plants with acrid juice, often toxic.
- Stems erect or reclining, sometimes rooting, often hollow.
- Leaves variously divided, the cauline alternate.
- Flowers perfect, regular, petals and sepals usually 5 each, petals white or more commonly yellow.
- Fruit a spherical or cylindric head of achenes.
- Style persistent on achenes as a beak, these varying in length, curvature.

Key to Ranunculus

1. Petals white; plants normally aquatic. 2

Petals yellow; habitat variable. 3

2. Petioles evident, exserted from the basal stipules; leaves collapsing when taken from water; fruiting pedicels not recurved; achenes 5-25 per head, 1.5-2 mm. long, beaks less than 0.3 mm. long. *R. aquatilis*

Petioles shorter than basal stipules; leaves retaining their shape when lifted from water; pedicels recurved in fruit; achenes 30-80 per head, to 1.5 mm. long, beaks 0.2-0.5 mm. long. *R. circinatus*

3. Leaves shallowly toothed, or entire; plants with stolons. 4

Leaves, at least some, more deeply toothed. 5

4. Leaves linear/narrowly oblanceolate, entire; achenes smooth. *R. reptans*

Leaves round-cordate and toothed; achenes with ribs. *R. cymbalaria*

5. Aquatic or stoloniferous shoreline plants; leaves circular in outline, sometimes finely dissected. *R. gmelinii*

Plants mostly with erect stems. 6

6. Basal leaves shallowly toothed, often cordate, the upper deeply divided. 7

At least some basal leaves deeply divided and similar to (but larger than) the cauline. 10

7. Basal blades reniform, occasionally 3-lobed; petals shorter than sepals, 1.5-3 mm. long. *R. abortivus*

Petals longer and wider than sepals, at least 3 mm. long. 8

8. Small plants mostly less than 1.5 dm. tall; achenes glabrous, in globose heads; petals 7-8 mm. long. *R. rhomboideus*

Plants mostly over 1.5 dm. tall; achenes hairy, in cylindrical heads. 9

9. Leaves mostly not cordate; flower stalks often not longer than upper leaves; petals 3-8 mm. long. *R. inamoenus*

Leaves mostly cordate; flower stalks elongate; petals showy, 8-15 mm. long. *R. cardiophyllus*

10. Well developed leaves with terminal segment stalked. *R. macounii*

All leaf segments sessile. 11

11. Petals short, to 5 mm. long; achenes nearly beakless, glabrous. *R. sceleratus*

Petals more than 5 mm. long. 12

12. Leaves 3-5 palmately lobed; achenes with sharp margins, definitely flattened; large introduced species. *R. acris*

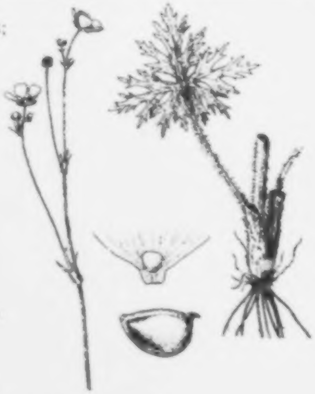
Leaves more deeply divided (3-5 times); achenes without margins and not flattened; native. 13

13. Plants mostly glabrous; basal leaves with 3 primary lobes and again lobed; small subalpine/alpine species. *R. eschscholtzii*

Plants with evident hairs; basal leaves 5-divided; larger species of varied elevations, widespread. *R. pedatifidus*

Ranunculus acris L. - Tall Buttercup

Growth Habit: Perennials from slender fibrous roots; stems 1-several, usually branched above, **to 1 m. tall**, mostly coarse-hairy, distinctly hollow, **erect**, not rooting at the nodes.

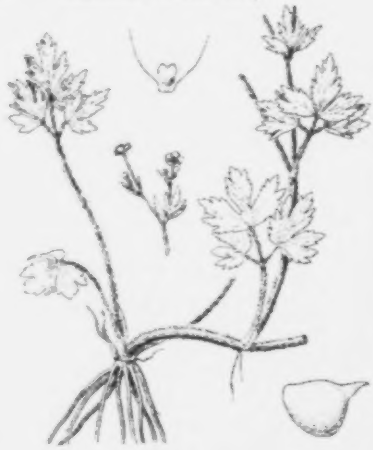


Blades: Basal leaves long-stalked, broadly cordate in outline, **2-8 cm. long**, **deeply 3-lobed** and **with the lateral lobes again deeply divided** (thus appearing 5-lobed); **primary divisions again 2-3 times incised** into narrow, pointed segments; cauline blades gradually smaller and less incised, transitional to the 3-5 lobed bracts; stalks and blades (on both surfaces) coarse-hairy.

Inflorescence: Flowers several, on stalks **up to 12 cm. long**; sepals greenish, long soft-hairy, 4-6 mm. long, **spreading but not reflexed**, quickly deciduous; petals large, **8-16 mm. long, yellow**; receptacle and fruiting head **subspherical**, achenes 15-40 per head, **hairless, flattened and keel-margined**, 2-3 mm. long; beaks broad and **flattened, curved, short** (to 0.6 mm. long).

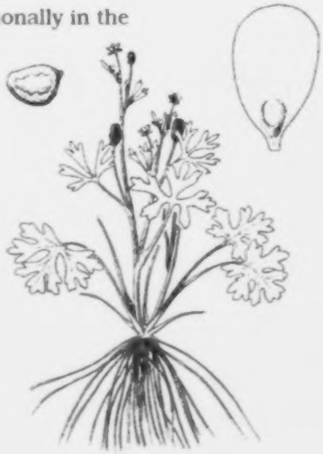
Similar Species:

1. ***Ranunculus macounii*** Britt. - Macoun's Buttercup
Common throughout most regions, absent from the dry prairies. Grows on shores, in moist woods, in swampy places. Also common (but less so in northern regions) is *R. pensylvanicus* L.f., similar except petals shorter than sepals and fruiting heads oblong.
Distinguishing features:



   - Stems hollow, ridged, to 7 dm. tall.
   - Plants sometimes reclining and rooting at the nodes.
   - All blades deeply divided.
   - Larger blades with 3 stalked leaflets, these again 2-3 cleft and toothed.
   - Stems and blades coarsely-hairy.
   - Petals yellow, 4-6 mm. long (mostly longer than sepals).
   - Achenes hairless, in a rounded-ovoid head.
   - Achenes with sharp margins, the beaks to 1.5 mm. long, straight or slightly bent.

2. ***Ranunculus sceleratus*** L. ssp. ***multifidus*** (Nutt.) Hult. - Cursed Crowfoot
Common in most regions, occasionally in the prairies. Grows in moist and often brackish places, sometimes semi-aquatic.
Distinguished as follows:



   - Plants from rather fleshy roots, to 6 dm. tall.
   - Stems hollow, ridged, hairless, mostly erect.
   - Blades rounded in outline, deeply 3-5 divided into wedge-shaped segments, again lobed and toothed (celery-leaf shaped).
   - Plants mostly hairless.
   - Petals yellow, 2-4.5 mm. long, mostly shorter than sepals.
   - Achenes hairless, numerous, in an ovoid-cylindric head.
   - Achenes with very short beaks.

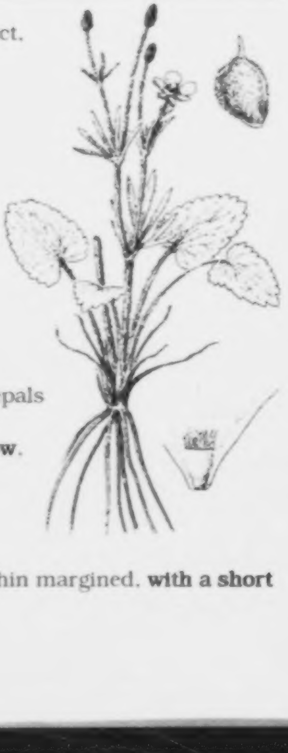
Habitat & Distribution: Introduced and rather common throughout in moist areas. Grows in depressional grassland and in low meadows, along streams and springs.

Forage Value: Poor, buttercups in general are nutritionally inferior to good range grasses and contain acrid juice, making them unpalatable (although there are some reports that they are utilized by game early in the season); buttercups contain protoanemonin, actual toxicity varying with species, *R. acris* and *R. sceleratus* known to contain especially high concentrations; an irritant, protoanemonin causes inflammation of the throat and digestive tract which can be fatal if large quantities are ingested; all animals may be affected but cattle are most commonly poisoned; the toxic principle is volatile, dissipating in drying, thus buttercup can safely be fed in hay.

Grazing Response: An invader, originally from Europe, and now widely naturalized and has become very common in moist grassland in the foothills.

Notes: *Ranunculus*, first used by Pliny, is from the Latin *rana*, frog, alluding to the aquatic habitat of many species, *acris*, probably a reference to the pungent smell and taste of the species; the common name buttercup originates from the resemblance of the shiny yellow petals of many species to butter; protoanemonin has similar effects on the human digestive tract, and can cause blisters and redness when in contact with skin.

Ranunculus cardiophyllus Hook. - Heart-leaved Buttercup



Growth Habit: Perennials from fibrous roots; stems erect, freely branched, **to 4 dm. tall, hollow**, usually hairy.

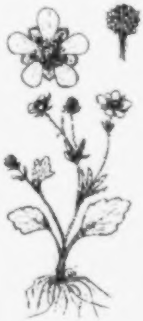
Blades: Basal leaves with stout petioles 2-12 cm. long; **basal blades ovate, cordate, mostly crenate**, occasionally more deeply lobed, **2-6 cm. long; cauline blades increasingly more deeply lobed upward**, the upper sessile, **with 3-7 linear lobes**, bract-like; blades hairy (especially below) to subglabrous.

Inflorescence: Flowers few-several **on thick pedicels**; sepals (5) yellowish, hairy, spreading and early deciduous; **petals exceeding sepals, yellow, showy, 8-15 mm. long (absent in some plants)**; nectary scale 1, the upper free margin ciliate; receptacle ovoid, **cylindric in fruit**, pubescent; **achenes pubescent**, somewhat compressed and thin margined, **with a short (to 1 mm.) straight beak**.

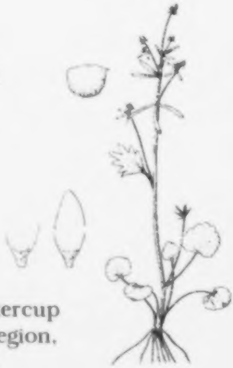
Similar Species:

1. ***Ranunculus pedatifidus*** J. E. Smith ssp. ***affinis*** (R. Br.) Hult. - Northern Buttercup
   Locally abundant in foothills, montane and parkland regions, in Cypress Hills. Considered by some authors to be a variety of *R. cardiophyllus*.
   Differs from it as follows:
   - Basal blades more deeply cleft, usually divided into 5-7 linear (and often incised) divisions; plants somewhat intermediate between the two species occur, having shallowly lobed basal leaves.

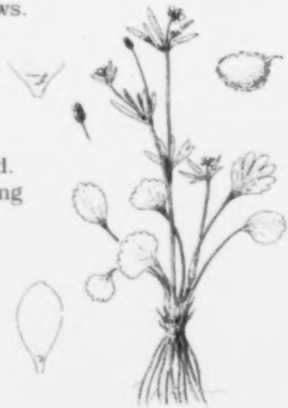
2. ***Ranunculus rhomboideus*** Goldie - Prairie Buttercup
   A species found in fescue grassland, in dry to moist open woods and thickets, sometimes in depressional grassland. Occurs sporadically throughout most regions, with highest concentrations in the parkland and foothills.
   Differs as follows:
   - Smaller plants, 1-2 dm. tall.
   - Petals only 7-8 mm. long.
   - Achenes glabrous, in a globose head.



3. ***Ranunculus abortivus*** L. - Small-flowered Buttercup
   Scattered throughout in moister, wooded regions. Found in open woods, along streams, in moist thickets.
   Vegetatively similar to *R. rhomboideus*, but differs:
   - Taller (2-8 dm.).
   - Petals inconspicuous, to 3 mm. long, pale yellow.

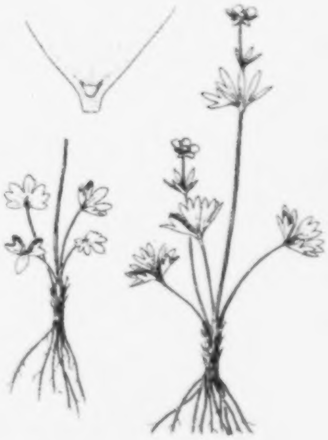


4. ***Ranunculus inamoenus*** Greene - Buttercup
   Rather frequent in the Rocky Mountain region, also in the Cypress Hills. Found in moist grassland, in open montane meadows.
   Distinguished as follows:
   - Erect plants 1-3 dm. tall.
   - Basal blades rounded but rarely cordate, shallowly lobed-crenate.
   - Upper leaves narrowly 3-divided.
   - Flower stalks often not elongating beyond upper leaves.
   - Petals 3-8 mm. long.
   - Achenes in cylindrical heads, hairy, the beaks slender.



Other Species:

1. ***Ranunculus eschscholtzii*** Schecht. - Buttercup
   One of a number of buttercups found at subalpine/alpine elevations, considered locally the most common of these. Found in moist places. Distinguished as follows:
   - Plants 1-3 dm. tall, mostly glabrous.
   - Leaves stalked (lowest), 3 (5) divided, also lobed, the bases round truncate.
   - Involucre of leaves often just below flowers.
   - Sepals pink-tinged and often with hairs below.
   - Flowers 1-3, the petals yellow, 5-10 mm. long.
   - Achenes glabrous, in an oblong head, not flattened and without sharp margins.



Habitat & Distribution:

Frequent in foothills, montane and parkland regions and in Cypress Hills. Grows in fescue grassland, in moist meadows, open woods, in montane meadows.

Forage Value:

Poor, members of the genus unpalatable and also contain the toxic substance protoanemonin; most are early species, and are sometimes utilized in the spring before palatable forage is available; none are ever very abundant and would unlikely be consumed in sufficient quantities to produce adverse symptoms.

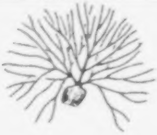
Grazing Response:

Increasers but none of the above mentioned species considered invasive.

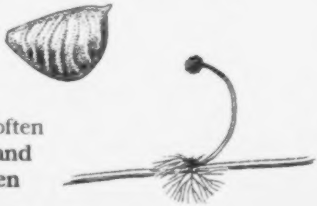
Notes:

The specific name *cardiophyllus* refers to the heart-shaped basal blades; both *R. cardiophyllus* and *R. pedatifidus* are rather spectacular species, also as such are excellent candidates for use in wild gardens; *R. abortivus* is an excellent early successional species in its adapted range, but unfortunately cannot out-compete the invasive *R. acris* that is now replacing it throughout many of our depressional grasslands in the foothills region.

Ranunculus circinatus Sibth. var. ***subrigidus*** (Drew) L. Benson -
White Water Crowfoot



Growth Habit: **Aquatic perennials, with reclining and rooting or floating stems to 1 m. long.** 1-2 mm. thick, sparsely to moderately hairy.

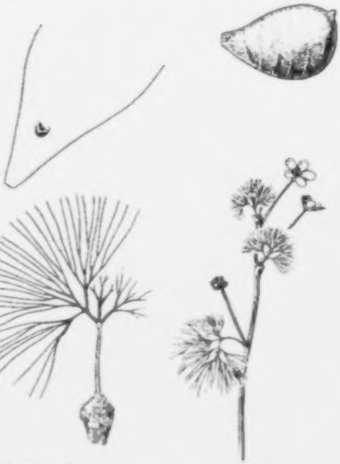


Blades: **Leaves sessile** (petioles not extending beyond stipular base); submersed **leaves 2-7 times divided into filiform segments**; floating blades similar or somewhat less finely divided; leaves often with some pubescence, **usually firm and maintaining their rounded shape when removed from water**.

Inflorescence: Flowers mostly solitary at the ends of rather stout pedicels, **these distinctly recurved in fruit**; sepals early deciduous, **petals white**, 5-9 mm. long; **achenes 30-80** in a globose head, **each 1-1.5 mm. long**, somewhat compressed, transversely wrinkled, pubescent to glabrous; **beaks 0.2-0.5 mm. long**.

Similar Species:

1. ***Ranunculus aquatilis*** L. var. ***capillaceus*** (Thuill.) DC. -
White Water Crowfoot
Less common, found sporadically in western and central regions.
Differs as follows:
   - Petioles evident, usually well exserted from stipular base.
   - Blades more flaccid, not circinate, collapsing and losing shape when taken from the water.
   - Fruiting pedicels usually not recurved.
   - Achenes less (15-25) per head but averaging larger (1.5-2 mm. long).
   - Beaks minute (less than 0.3 mm.).



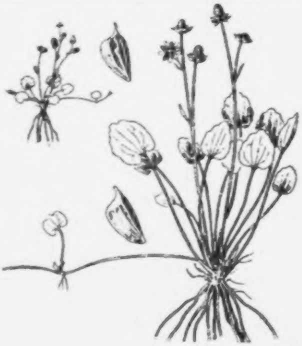
Habitat & Distribution: Common and widely distributed throughout. Aquatic, growing in ponds and lakes, in slow streams.

Forage Value: Poor, rated as at least somewhat toxic due to the presence of protoanemonin; under normal circumstances white buttercups are not grazed, but in cases where dense colonies occur, and when wetlands are heavily used by livestock, minor symptoms can result.

Grazing Response: Increasers, the genus as a whole classed as increasers as far as terrestrial species are concerned, aquatics often not directly impacted by, and thus not responding to grazing intensity.

Notes: Our aquatic buttercups have unique adaptations within the leaf structure that are common to aquatics in other families: the submersed blades are more finely dissected and fern-like, consisting primarily of the major vein groups.

Ranunculus cymbalaria Pursh - Seaside Crowfoot; Creeping Buttercup



Growth Habit: Perennials from slender, fibrous roots; stems usually several, hairless to hairy, many of them **reclining, stoloniferous, rooting at nodes, 1-4 dm. long**, erect stems shorter.

Blades: Mostly **basal, numerous**, very long-stalked, **rounded-ovate, cordate-based** and shallow-toothed, **not deeply lobed**, mostly hairless, **1.5-3.5 cm. long**.

Inflorescence: Flowers solitary to few, on **leafless stalks 5-25 cm. tall**, sepals greenish-yellow, 2-4 mm. long; petals 5 (sometimes 6-12), **yellow, 3-10 mm. long**; achenes about 2 mm. long, distinctly 2-4 ribbed on each side, **hairless**, 50-200 in an **oblong head, beaks stout**, erect to slightly incurved, about 0.5 mm. long.

Similar Species:

1. ***Ranunculus reptans*** L. - Creeping Buttercup
   Widespread, found on moist shores.
   Differs as follows:
   - Small stoloniferous plants, stems very fine, rooting at nodes.
   - Leaves mostly stalked, 1-3 cm. long, linear to narrow-oval, entire.
   - Petals yellow, small, to 5 mm. long, twice sepal length.
   - Achenes in a spherical head, not ribbed, with very short curved beaks, about 5-20 per head.

Habitat & Distribution: Common throughout all ecoregions. Grows in moist to wet places: on streambanks, on sandy shores, in marshy areas. Frequently found in moderately saline or alkaline places.

Forage Value: Poor, like other buttercup species, nutrient levels are relatively low, and plants are unpalatable; *Ranunculus cymbalaria*, although toxic, has somewhat lower protoanemonin concentrations than *R. acris* and *R. sceleratus*, and, as well, produces considerably less forage, hence is rarely responsible for livestock poisoning.

Grazing Response: Increasers; like most native buttercups, however, the species is seldom invasive or troublesome.

Notes: *Cymbalaria*, from the Latin *cymbalum*, a hollow vessel or cup; the common name crowfoot, applied to various buttercups, is because of the resemblance of the blades of some species to a crow's foot; *Ranunculus cymbalaria* is of some value in providing cover on moist saline and alkaline flats and along sandy shorelines; it has the reproductive advantage of spreading by both stolons and seeds.

Ranunculus gmelinii DC. - Yellow Water Crowfoot

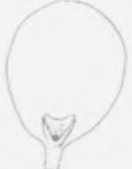
Growth Habit: Plants from slender fibrous roots; **stems either floating, or reclining and rooting at nodes**; stems hollow, up to 5 dm. long, pubescent to glabrous.

Blades: Mostly cauline, **1-2 (3) cm. long**, with petioles to 5 cm. long, **circular and cordate-based in outline, palmately 3-5 divided, the segments linear-cuneate**, variously pubescent, **submersed leaves tending to have narrower divisions than floating or terrestrial blades**.

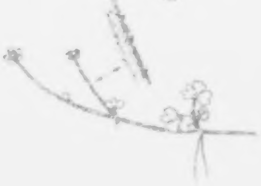
Inflorescence: Flowers few (1-4), on stalks 1-5 cm. long; sepals 5, early deciduous, 2.5-6 mm. long; **petals 5, yellow, 3-7 mm. long**; stamens 20-45; **achenes 40-80 in an ovoid head**, each 1.5 mm. long, **distinctly flattened**, whitish-swollen on lower half or 2/3; **beaks flattened, thin, 0.5-1 mm. long, more or less straight.**

Varieties:

1. Var. ***gmelinii***
   - Foliage sparsely to moderately hairy.
   - Blades 3-parted, then finely dissected into linear, acute divisions.
   - Petals and sepals to 3 mm. long.



2. Var. ***limosus*** (Nutt.) Hara
   - Foliage definitely pubescent.
   - Blades 3-parted and again once or twice-divided into shallow, broad and obtuse lobes.
   - Sepals 2.5-3.5 mm. long, petals 3.5-5 mm. long.



3. Var. ***hookeri*** (D. Don) L. Benson
    - Mostly glabrous.
    - Leaves deeply 3-parted and again 2-3 times parted or deeply dissected into acute lobes.
    - Sepals and petals about 3-6 mm. long.

Habitat & Distribution: Common throughout all but driest regions. Found in wet places: often submersed or floating in ponds, lakes, and shallow streams. Also common on shores, mud flats, around sloughs.

Forage Value: Poor, seldom grazed and sometimes unavailable due to aquatic habitat.

Grazing Response: Increasers, capable of re-rooting by means of stolons when trampled or otherwise disturbed.

Notes: *R. gmelinii* is an attractive amphibious buttercup with variations in leaf dissection that result from both genetic variations and habitat conditions involving various degrees of submersion; it is well adapted to seasonal fluctuations in water levels, and its ability to quickly re-establish via stolons is of some benefit in stabilizing muddy shorelines.

THALICTRUM L. - Meadow Rue

Common Characteristics

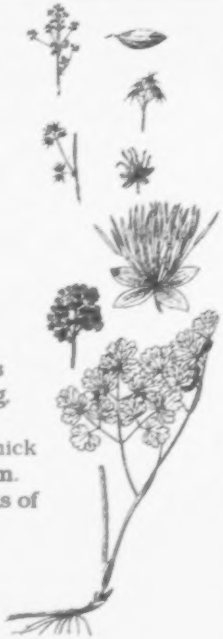
- Rhizomatous perennials, roots often felty-hairy.
- Blades stalked, twice or three times compound, the primary divisions and leaflets stalked.
- Flowers usually numerous, small, in panicles or racemes.
- Flowers perfect (in one species) or imperfect, male and female flowers on the same or on different plants.
- Sepals pale to greenish, 4-5, early deciduous.
- Petals none.
- Stamens conspicuous, numerous, with elongating filaments.
- Fruit a sessile or short stalked, ribbed, hairless achene.
- Styles persistent, elongating as beaks on achenes.

Key to Thalictrum

1. Foliage with some glandular hairs; peduncles wide-spreading, of about the same length; filaments 5-10 mm. long; achenes reflexed, 5-6 mm. long *T. occidentale*

Foliage glabrous; peduncles ascending, of different lengths; filaments 3-5 mm. long; achenes ascending, 3-5 mm. long *T. venulosum*

Thalictrum venulosum Trel. - Veiny Meadow Rue



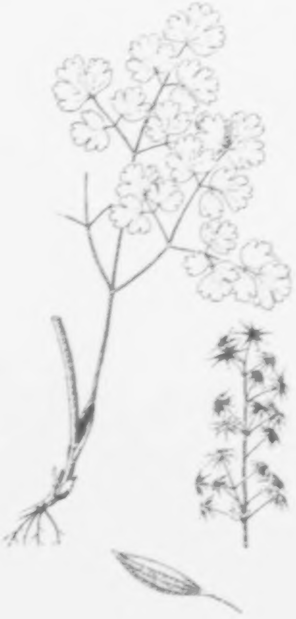
Growth Habit: **Strongly rhizomatous** perennials; **stems 2-9 dm. tall**, little branched above, **hairless and not glandular**.

Blades: Mostly cauline, **alternate**, the uppermost sessile; 3-4 ternate, the stalked leaflets 1-2 cm. long, broader than long, **rounded to wedge-shaped-based, 3-lobed and toothed; firm, blue-green, pale and distinctly net-veined beneath; hairless and not glandular.**

Inflorescence: Panicles narrow, with small bracts; sepals **greenish-white, 2-4 mm. long**; pistillate flowers nearly stalkless, 3-5 mm. long, **stigmas yellow**, short; anthers elongate, **2-3.5 mm. long**, on very slender filaments; **filaments 3-5 mm. long**; achenes nearly stalkless, **hairless**, with thick ribs and narrow grooves, **ovoid-oblong, 3-5 mm. long**; achenes ascending, **not reflexed, on stalks of different lengths**.

Similar Species:

1. ***Thalictrum occidentale*** A. Gray - Western Meadow Rue
   Restricted to the southern Rocky Mountains, and higher elevations in boreal regions and Cypress Hills. Found in moist woods, in wet thickets and meadows.
   Differs as follows:
   - Foliage usually at least somewhat glandular-hairy.
   - Veins on lower leaf surface not as distinct.
   - Peduncles wide-spreading, nearly the same length.
   - Stigmas longer (to 4 mm.) and purplish.
   - Filaments 5-10 mm. long.
   - Achenes more compressed, on longer stipes (to 1.5 mm.), and larger (5-6 mm. long).
   - Achenes spreading to reflexed.



Habitat & Distribution: Common throughout all but the driest regions. Found in aspen woods, mixed woods, willow thickets in moist fescue grassland. Associated with rich, moist sites.

Forage Value: Poor, the genus as a whole unpalatable because of the bitter, acrid juice, and the roots mildly toxic (some European and S. American species with highly poisonous roots due to concentrations of the alkaloid thalictrine).

Grazing Response: An increaser, and utilization of the species to any extent indicates overgrazing.

Notes: *Thalictrum* is the Latinized form of *Thalictron*, used by the Greek writer Dioscorides in the first century B.C. to describe a plant (probably a *Thalictrum* species); the specific name alludes to the veiny leaves; the term "rue" because of a comparison of the bitter-tasting juice of meadow rue species and some members of the rue (*Rutaceae*) family; various members of the genus were used rather extensively by native people, the seeds and leaves as a perfume and love potion, insect repellent, and taken internally to improve circulation, reduce phlegm and to ease stomach disorders; some Indians believed washing their heads in meadow rue juice stopped headaches, and the Blackfoot Tribe administered the foliage to horses to make them long-winded and increase stamina; veiny meadow rue (as well as other members of the genus) has ornamental value and shows promise for use in wild flower mixes in reclamation projects; plants establish readily from both seed and root sprigs.

FUMARIACEAE - Fumitory Family
CORYDALIS Medic. - Corydalis

Common Characteristics

- Leafy biennials, glabrous and often glaucous.
- Leaves alternate, bipinnately dissected.
- Flowers irregular, in racemes.
- Sepals small, 2.
- Petals 4, one of outer pair basally spurred, and both slightly keeled, dilated at apex.
- Inner petals similar at apex, coherent over stigma.
- Stamens 6, in 2 sets, opposite outer petals.
- Middle anther of each set 2-celled, the lateral 1-celled.
- Pistil 1-loculed, with 2 carpels, stigma 2-lobed.
- Fruit an elongate, slender 2-valved capsule.
- Seeds black, glossy.

Key to Corydalis

1. Flowers pink-purple, the tips yellowish; capsules ascending. *C. sempervirens*

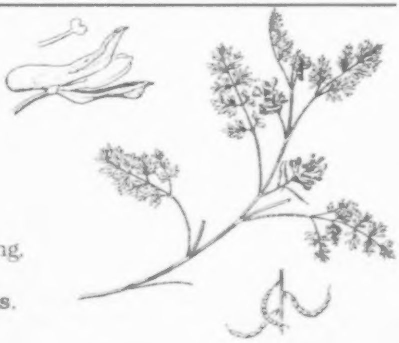
Flowers yellow; capsules spreading-pendulous. *C. aurea*

Key to Impatiens

1. Flowers pale yellow, spots lacking or small/numerous; spur to 20 mm. long, not abruptly bent; sac 1/2 as broad as long. *I. noli-tangere*

Flowers pale yellow to brighter orange, **red-purple spotted** (usually); spur to 18 mm. long, **abruptly bent back; sac 2/3 as broad as long**, abruptly narrowed. *I. capensis*

Corydalis aurea Willd. - Golden Corydalis



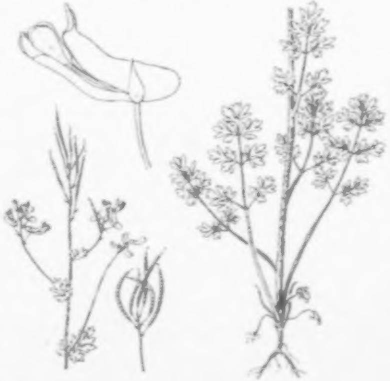
Growth Habit: Ascending/reclining plants 1-3 dm. tall, **glabrous and glaucous; plants bushy-diffuse**.

Blades: Leaves **bipinnate, with pinnatifid leaflets**.

Inflorescence: **Corolla yellow**, 12-15 mm. long, **with a spur 4-5 mm. long; capsules spreading-pendulous**, mostly constricted; seeds 2-2.5 mm. broad, smooth.

Similar Species:

1. ***Corydalis sempervirens*** (L.) Pers. - Pink Corydalis
Scattered and rather widely distributed in all ecoregions except the prairies, most common in the boreal forest. Found in open woods, frequently in recently disturbed sites. Distinguished as follows:
    - Plants often taller, 3-6 dm. high.
    - Leaves more pale-glaucous/blue-green.
    - Flowers pink-purple, with yellow tips.
    - Capsules erect-ascending.
    - Seeds 1.3-1.5 mm. wide, with low tubercles.



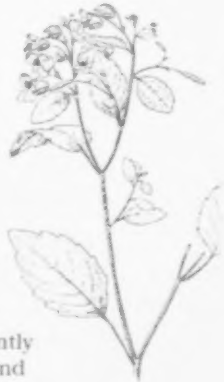
Other Species:

1. ***Impatiens capensis*** Meerb. - Touch-me-not
Belonging to *Balsaminaceae*, the touch-me-not family, which differs from *Fumariaceae* by having leaves undivided. A southern boreal species, found on shores, in moist woods.

Distinguished as follows:

- Plants often over 10 dm. tall.
- Leaves alternate, simple, stipules lacking.
- Blades thin, stalked, ovate, toothed.
- Flowers yellow to orange, purple (red)-spotted (usually).
- Flowers irregular, with a large spurred sac, 2 small green sepals, and 3 lobed portions (petals).
- Spur to 18 mm. long, sac about 2/3 as broad as long, abruptly contracted into spur.
- Spur bent parallel to sac.
- Stamens 5, pistil with 5 locules.
- Fruit a capsule (pod) exploding when ripe or touched.

2. ***Impatiens noli-tangere*** L. - Touch-me-not
Also boreal but more likely to be found in northern as well as southern regions. Grows in similar habitats.
Differs from *C. capensis*:
    - Teeth on leaves often more pronounced.
    - Flowers paler yellow, spots lacking or numerous and small.
    - Spur not as abruptly curved, the sac 1/2 as broad as long; spur to 20 mm. long.



Habitat & Distribution: Common in all regions except the dry prairie area. Found on shores, in open woods, frequently associated with recent clearing, burned sites and other disturbances.

Forage Value: Poor, various members of the family considered poisonous to livestock due to the presence of toxic alkaloids; sheep, cattle and horses are all susceptible, but locally, our species are rarely sufficiently abundant to cause problems; symptoms in affected animals include depression, uneasiness, twitching (especially in the face), convulsive spasms, scouring, bawling, snapping at objects with the mouth.

Grazing Response: Increasers.

Notes: *Corydalis*, in Greek, translates crested lark, most likely alluding to the tubular projection of the uppermost petal; also known as fitweed, appropriately describing the characteristic biting and twitching movements of poisoned animals; both species are valued for their early successional response following mechanical disturbance and fire, competing successfully except in the event that aggressive non-native weeds have been introduced; *Corydalis* and the related *Dicentra* (bleeding heart) have delicate, fern-like leaves and unusual flowers, and make low maintenance garden ornamentals.

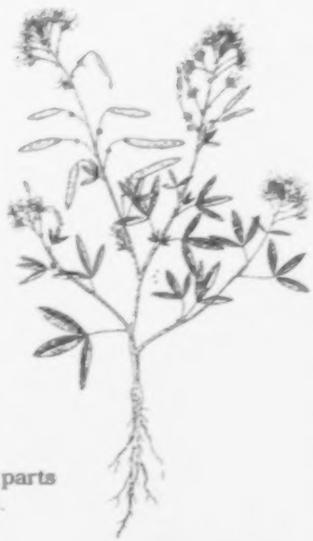
CAPPARIDACEAE - Caper Family

Common Characteristics

- Annual (ours) herbs.
- Leaves alternate, with 3 leaflets, these mostly entire.
- Flowers mostly perfect, in terminal racemes.
- Sepals and petals each 4, flowers often slightly irregular.
- Stamens long exserted.
- Fruit a 2-valved pod.
- Pods with 1 compartment.

CLEOME L. - Cleome; Spiderflower

Cleome serrulata Pursh - Bee Plant; Rocky Mountain Bee Plant



Growth Habit: **Annuals from taproots**; stems **"woody," hairless, pale green**, somewhat **ridged and angled**, erect, **freely branched above**, **2.5-9 dm. tall**; base of stem often with raised **net veins**.

Blades: Leaves **3-divided**, the leaflets **lanceolate-oblanceolate**, mostly short-stalked, 1.5-7 cm. long, **hairless, paler beneath, entire to very finely toothed**; lowest leaves long-stalked, the upper often sessile.

Inflorescence: Racemes compact during flowering, **greatly elongating in fruit**; stalks (of mature capsules) 1-2 cm. long and **spreading-curving downward**; **flower parts in 4's**, sepals united below, 2.5-3 mm. long, lobes pointed; petals **pink**, occasionally white (forma *albiflora* Cockerell), **8-12 mm. long**; stamens 6, **conspicuously exserted**; pods **drooping, linear-oval**, nearly rounded, **2.5-5 cm. long**, each with several roughened seeds.

Habitat & Distribution: Common in the prairies, occasional in parkland and foothills ecoregions. Frequent in sandy grassland, active dunes, gravelly or sandy ditches and roadsides, often on disturbances.

Forage Value: Poor; although little specific data is available, bee plant is unpalatable and is generally considered worthless as a range plant.

Grazing Response: An increaser #1, quickly spreading onto disturbances and in overgrazed sandy grassland, but is a rather poor competitor once perennial species establish.

Notes: The generic name was used by Theophrastus for a now unknown mustard-like plant, originating from the word *Kleio*, to shut, the reference now lost; the common name bee plant alludes to the species' exceptional attractiveness to bees and other sand-loving insects; traditional uses were rather few, although apparently Blackfoot people made a tea from the foliage, this supposedly to relieve fever; bee plant is an attractive ornamental, especially suited to dry locations and also an excellent early successional reclamation species in the prairie region.

CRUCIFERAE - Mustard Family

Common Characteristics

- Annual to perennial herbs, often with acrid juice.
- Foliage often with branched to star-shaped hairs.
- Leaves alternate, without stipules, simple to compound.
- Flowers perfect, regular, in corymbs or racemes.
- Sepals 4, petals usually present, 4.
- Stamens commonly 6, the outer 2 shortest.
- Fruit mostly pod-like.
- Seeds usually numerous, in 1 or 2 rows per compartment.

Key to Cruciferae

1. Fruit relatively short, 2-3 times as long as broad. 2

   Fruit elongated-linear. 3

2. Petals mostly white (pinkish). Group I

   Petals yellow. Group II

3. Petals white, pink or purple. Group III

   Petals yellow. Group IV

Group I

1. Tall rhizomatous perennials; inflorescence flat-topped. *Cardaria*

   Annuals or biennials (in this text); inflorescence elongate. *Lepidium*

Group II

1. Leaves obscurely toothed to entire; small plants of dry or exposed sites. 2

   Leaves deeply toothed/divided; larger plants of mesic to wet sites. 3

2. Leaves silver, spatula-shaped, to 4 cm. broad;
   petals 8-12 mm. long; pods inflated. *Physaria*

   Leaves lanceolate-oblanceolate, mostly narrower than 1 cm.;
   petals to 8 mm. long; pods not inflated. *Lesquerella*

3. Rather weedy plants of dry places; hairs star-shaped; plants often glandular. *Descurainia*

Plants of wet places; hairs simple or plants glabrous. *Rorippa*

Group III

1. Plants of moist to wet habitats. *Cardamine*

Plants of drier habitats. 2

2. Pods often twisted, oblong-lanceolate. *Draba*

Pods elongate-linear and not twisted. *Arabis*

Group IV

1. Leaves entire to very shallowly toothed. 2

Leaves deeply divided. 3

2. Cauline leaves without basal auricles, not sessile-clasping. *Erysimum*

Cauline leaves with auricles and clasping the stems. *Arabis*

3. Plants with forked to stellate hairs. *Descurainia*

Plants with simple hairs. *Sisymbrium*

ARABIS L. - Rock Cress

Common Characteristics

- Biennial (annual) to perennial herbs, occasionally woody-based.
- Stems hairy below with mostly branched hairs.
- Basal blades (often a rosette) stalked, entire to pinnately divided.
- Cauline blades alternate, often sessile and with basal lobes (auricles).
- Racemes elongate.
- Petals white to pink.
- Pods linear, flat (occasionally rounded).
- Seeds flat, in some species with a marginal wing.

Key to Arabis

1. Siliques erect, narrow (less than 1.5 mm. wide); seeds without wings or with very narrow wings (to 0.3 mm. wide); flowers creamy to white or pink-tinged. 2

Siliques erect to reflexed, broader (more than 1.5 mm. wide); seeds with wings (more than 0.3 mm. wide); flowers white to pink-purple. 4

2. Plants mostly less than 3 dm. tall, glabrous or with a few hairs at the base; cauline leaves without auricles; basal leaves pinnate, the terminal segment larger, lyre-shaped; of sandy places. *A. lyrata*

Plants usually at least 3 dm. tall, hirsute at the base; cauline leaves with auricles. 3

3. Upper stems glabrous, glaucous; upper leaves clasping; siliques not distinctly compressed, 5-9 cm. long. *A. glabra*

Upper stems often spreading-hairy, not glaucous, siliques compressed, 3-5 cm. long. *A. hirsuta*

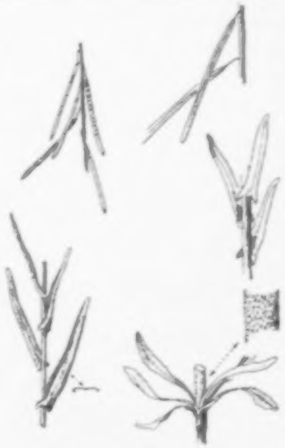
4. Stem/leaf hairs simple to 2-forked; siliques always erect, 2-3 mm. wide; seeds with broad wings along one end and side, wings to 1 mm. broad. *A. drummondii*

Stem/leaf hairs often 3 or more-forked; siliques 1-2.5 mm. broad, erect to spreading; seeds with wings to 0.5 mm. broad. 5

5. Hairs on foliage much branched, felty; siliques straight, conspicuously compressed, usually distinctly reflexed. *A. holboellii*

Hairs below mostly 3-divided, not felty; siliques mostly spreading, not sharply reflexed. *A. divaricarpa*

Arabis holboellii Hornem. var. ***retrofracta*** (Graham) Rydb. - Reflexed Rock Cress



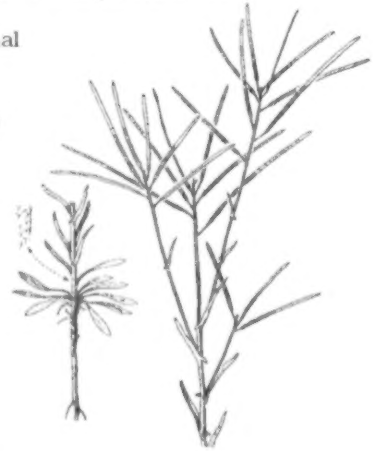
Growth Habit: Biennial or short-lived perennial from taproots with a branched or more often simple caudex; stems 1-several, 2-7 dm. tall, often branched above; lower stems with sparse to **dense tree-like (dendritic) branched hairs**, upper stems often hairless.

Blades: Basal blades usually in rosettes, linear-oblanceolate to broader and spatula-shaped, entire to toothed, usually **densely, often felty-hairy with many-branched hairs**, to 2.5 cm. long, narrowed to short stalks; cauline leaves often overlapping, entire, sessile, **with auricles**, **margins rolled**, commonly **hairy** to summit of stem **with branched hairs**.

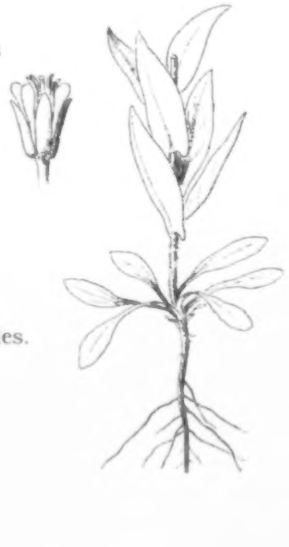
Inflorescence: Racemes many flowered (20-80+), elongating in fruit, the **stalks sharply abruptly bent and reflexed at the base**; sepals 2.5-5 mm. long, hairy with freely branched hairs, pale-margined; petals **5-10 mm. long, pale pink to purple**; pods hairless, 3-7 cm. long, **straight, usually sharply reflexed**, seeds mostly in 1 row, **winged around entire margin**.

Similar Species:

1. ***Arabis divaricarpa*** A. Nels. - Purple Rock Cress
   Frequent in foothills and parkland regions, occasional elsewhere. Grows on dry hillsides and slopes, in gravelly areas, in dry, often sandy grassland.
   Differs as follows:
   - Lower stems and lower leaf surface with simple to 3-branched hairs.
   - Sepals with 3-forked hairs.
   - Pods curved, erect to spreading, but not sharply bent downward.
   - Seeds winged around only part of the margin.

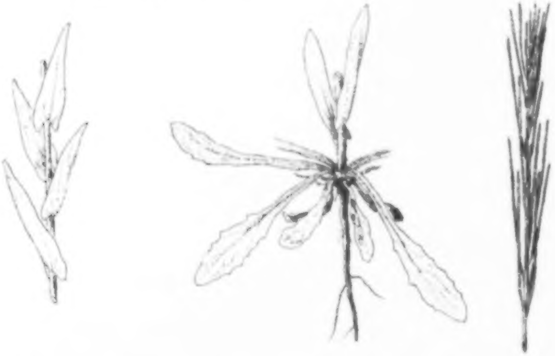


2. ***Arabis hirsuta*** (L.) Scop. ssp. ***pycnocarpa*** (Hopkins) Hult. - Rock Cress
   Occasional in the prairies, more frequent in other regions. Grows in open woods, in fescue grassland, on rocky slopes in montane areas, sometimes on disturbed sites.
   Distinguished by:
   - Stems 1.5-7 dm. tall, the lower portion with long, unbranched hairs.
   - Plants green, not glaucous.
   - Blades with long, unbranched hairs (uppermost sometimes hairless).
   - Cauline blades with basal auricles.
   - Petals cream-colored.
   - Pods erect, 3-5 cm. long, compressed.
   - Seeds in 1 row, wings not conspicuous.



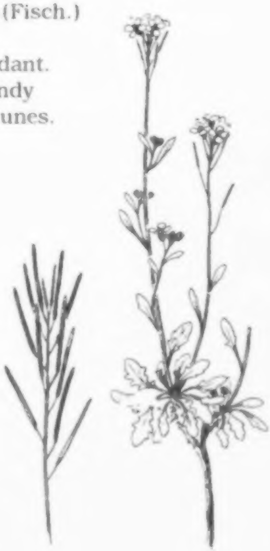
3. ***Arabis glabra*** (L.) Bernh. - Tower Mustard
Scattered throughout most regions in open woods and meadows, in disturbed places. Possibly introduced. Distinguished as follows:

- Stems more stout, and taller (4-10 dm.).
- Upper foliage glabrous and often glaucous.
- Cauline blades more ovate, mostly entire.
- Petals and sepals yellowish to creamy.
- Siliques longer (5-9 cm.) and not compressed.
- Seeds irregularly biseriate.



4. ***Arabis lyrata*** L. ssp. ***kamchatica*** (Fisch.) Hult. - Rock Cress
Widely distributed, often locally abundant. Associated almost exclusively with sandy soil, found in open sandy woods, in dunes. Primarily a parkland/boreal species. Distinguished as follows:

- Tufted perennials 1-4 dm. tall.
- Stems simple to branched, often flexible.
- Plants mostly glabrous, or with a few simple to forked hairs basally and on leaves.
- Basal blades lyrate-pinnatifid.
- Cauline blades narrow, basally tapering, without auricles, entire to toothed.
- Petals 3-8 mm. long, white-pinkish.
- Siliques spreading-erect, to 1.5 mm. wide and 4 cm. long.
- Seeds wingless.

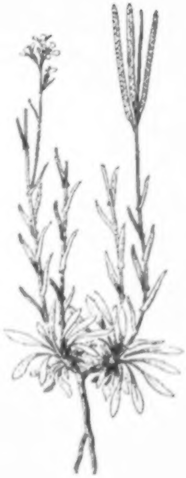


5. ***Arabis drummondii*** A. Gray - Rock Cress

Common in the Rocky Mountain region, occasional in all ecoregions except the prairies. Found in open places, in open woods.

Distinguished as follows:

- Often nearly glabrous perennials (biennials) 1-7 dm. tall, pubescence, when present, simple to 2-forked.
- Basal leaves oblanceolate, petioles often ciliate.
- Upper leaves lanceolate-oblong, sessile, clasping, with auricles.
- Petals pink-purple, 4-9 mm. long.
- Siliques erect, glabrous, 2-3 mm. wide.
- Seeds in 2 rows, with wings to 1 mm. broad around one side and one end.



Habitat & Distribution: Frequent in the foothills and montane regions, occasional elsewhere. Found in fescue and prairie grassland, on exposed banks and rocky slopes in foothills and montane regions, in open woods.

Forage Value: Poor, the genus as a whole with an unpalatable acrid or pungent taste, and only grazed when palatable forage has been depleted.

Grazing Response: Increasers.

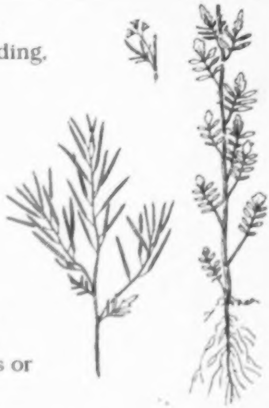
Notes: *Arabis*, from Arabia, to which some species are native; the common name rock cress suggests both the shallow rocky soils inhabited by many species, also the relationship of *Arabis* species to cresses, members of the mustard family used as salad greens; rock cresses are well suited for use as rock garden ornamentals, and may have some limited potential in reclaiming sites with shallow, rocky or sandy soils.

CARDAMINE L. - Bitter Cress

Common Characteristics

- Annuals, biennials or perennials with roots varying from fibrous, taproot, or slender to thickened-tuberous rhizomes.
- Pubescence of simple hairs or none.
- Leaves either simple or pinnately lobed.
- Racemes with several white (pink in one rare species) flowers.
- Siliques linear, dehiscent, essentially nerveless above base.
- Seeds uniseriate, not winged.

Cardamine pensylvanica Muhl. - Bitter Cress



Growth Habit: Biennials from a taproot and fibrous root system; **stems 1-5 dm. tall**, erect to spreading, branched above, ridged, purplish below, **pubescent below** (except in submersed leaves), glabrous above, or minutely pubescent in inflorescence.

Blades: Basal rosette of **several leaves 2-8 cm. long, these deeply pinnately lobed, the terminal lobe broadly obovate-elliptic**, leaflet bases decurrent (winged along the rachis); **cauline blades numerous, similar to basal**, leaflet bases often obliquely decurrent; blades glabrous or with scattered hairs.

Inflorescence: **Racemes elongate**, with erect pedicels; sepals about 2 mm. long, often purple-tinged; **petals about 4 mm. long, white**; siliques erect-ascending, mostly glabrous, **linear**, 1-3 cm. long with **styles 0.5-1.5 mm. long**; seeds 0.5-1.5 mm. long, wingless.

Habitat & Distribution: Frequent throughout most regions. Absent from dry areas in the prairies. Grows in moist places: on stream banks, in marshy, swampy areas, around sloughs, near springs or in boggy ground in coniferous forests.

Forage Value: Poor, somewhat palatable in early growth stages but otherwise used primarily in cases where overgrazing has depleted choice species.

Grazing Response: An increaser.

Notes: The generic name originates from *kardamon*, this is also the name from which the unrelated cardamom comes, the seeds of which are used in medicines and as a flavoring; the taxonomic status of *Cardamine* is somewhat insecure, variously lumped and split with the genus *Dentaria*, toothwort, folklore indicating that, because the round white rhizomes resemble teeth, the Creator intended the plant for the relief of dental distress. *Note*: Common on exposed slopes in the Rocky Mountain region is *Smelowskia calycina* (Stephan.) C.A. Mey. with similar leaf divisions and pale creamy flowers; plants are grey-hairy with branched hairs, pods oblong, 4-10 mm. long.

DESCURAINIA Webb and Berthelot - Tansy Mustard

Common Characteristics

- Annuals or biennials, stellate and often also glandular pubescent.
- Blades twice pinnate to finely dissected, the ultimate segments narrow.
- Flowers small, in racemes, these elongating in fruit.
- Petals yellow to cream, small.
- Siliques clavate to linear, mostly terete, the valves 1-nerved.
- Styles (beaks) small to nearly obsolete.
- Seeds in 1 or 2 rows per locule.

Key to Descurainia

1. Leaves bi/tripinnate, feathery; pedicels shorter than fruit; siliques 15-30 mm. long; seeds usually more than 20. *D. sophia*

Leaves mostly once-pinnate; pedicels more than 1/2 the length of fruit; siliques less than 15 mm. long; seeds often fewer. 2

2. Plants greenish, glandular above; fruit narrowly club-shaped (clavate), to 2 mm. wide, only slightly torulose; styles very short; pedicels equal to or longer than fruit. *D. pinnata*

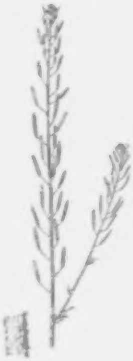
Plants grey-green, not glandular; fruit linear, to 1 mm. wide, torulose; styles evident; pedicels shorter than fruit. *D. richardsonii*

Descurainia richardsonii (Sweet) O.E. Schulz - Grey Tansy Mustard

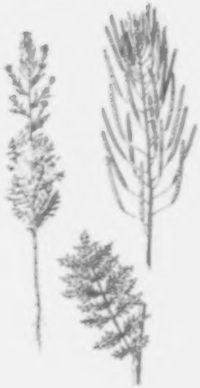
Growth Habit:	**Annual** (biennial), **usually branched above, 3-8 dm. tall; stems stellate-pubescent, grey-green, eglandular.**
Blades:	Leaves 2-10 cm. long, **the lower pinnate and again lobed to pinnatifid**, the ultimate lobes 1-3 mm. wide; upper blades reduced, less deeply lobed; **leaves grey-green with a close stellate pubescence.**
Inflorescence:	Racemes rather densely flowered, with pedicels slender, **mostly strictly erect, shorter than siliques; petals pale to deep yellow, 1.5-3.5 mm. long; siliques erect, linear, 5-12 mm. long and 1 mm. wide, torulose at maturity**, the replum 1-nerved; siliques pointed at the tip, **the style short but evident (0.5 mm. long)**; seeds uniseriate, 4-10 per locule.

Similar Species:

1. **Descurainia pinnata** (Walt.) Britt. - Green Tansy Mustard
   Also a weedy native, found primarily in disturbed areas, on waste ground. Generally less common but widely distributed.
   Differs as follows:
   - Plants (stems, leaves, inflorescence) less densely pubescent; greenish.
   - Upper portions of stems glandular.
   - Fruit narrowly clavate, 6-13 mm. long, 1-2 mm. wide, only slightly torulose.
   - Apex of siliques rounded, the styles obsolete to very short.
   - Pedicels equalling to longer than siliques, spreading to ascending.

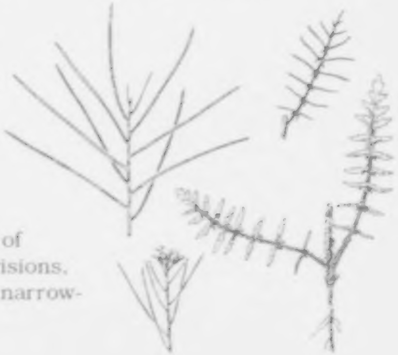


2. **Descurainia sophia** (L.) Webb - Tansy Mustard
   An introduced species, common in waste and disturbed places throughout.
   Distinguished by the following:
   - Plants generally taller (to 10 dm.) and much branched.
   - Plants grey-green with a stellate pubescence, eglandular.
   - Blades mostly cauline, 2-3 pinnate into narrow segments, ultimate divisions narrower.
   - Siliques linear, 15-30 mm. long, about twice as long as pedicels, about 1 mm. wide.
   - Replum 2-3-nerved.
   - Seeds uniseriate, usually more than 20 per locule.



Other Species:

1. **Sisymbrium altissimum** L. - Tumbling Mustard
   Introduced, found in much the same habitats as *D. sophia*.
   Distinguished as follows:
   - Annuals 6-12 dm. tall, with simple, bristly hairs.
   - Blades pinnately divided, the lower leaves with 5-8 pairs of oblong-lanceolate divisions, the upper with a few narrow-linear segments.
   - Petals pale yellow, 6-8 mm. long.
   - Siliques elongate, 5-10 cm. long, spreading, their pedicels noticeably thick.



Habitat & Distribution: Frequent throughout most regions. Grows in relatively dry places: on gravel bars, in sandy soil, in prairie grassland. Also common in disturbed places, on roadsides, in waste areas.

Forage Value: Poor, unpalatable and rarely utilized under normal conditions.

Grazing Response: Increasers (natives), normally not prominent in rangeland, any abundance of either native or introduced species usually an indication of poor management practices.

Notes: The genus was named in honor of Francois Descurain, a French botanist; both *D. sophia* and *Sisymbrium altissimum* are some of the first species to make their appearance on disturbances; while a plague in gardens and waste places, species such as these are actually considered of some benefit in rangeland, stabilizing disturbed soil but declining as perennial species begin to re-establish; on cultivated pastures, however, infestations can displace, also reduce palatability of desirable forage species, persisting as long as exposed soil is available.

DRABA L. - Draba

Common Characteristics

- Mostly small plants, annuals to perennials.
- Stems with or without leaves, a basal rosette usually present.
- Leaves simple, sometimes toothed.
- Leaf hairs from simple to stellate.
- Flowers in racemes, yellow or white, petals exceeding sepals.
- Pods flattened, oval to narrowly lanceolate, in some species twisted.
- Pods with 2 rows of seeds per locule.

Key to Draba

1. Small, cushion-like plants without stem leaves, to 6 (8) cm. tall; subalpine/alpine. *D. oligosperma*

Plants not cushion-like; stem leaves evident. 2

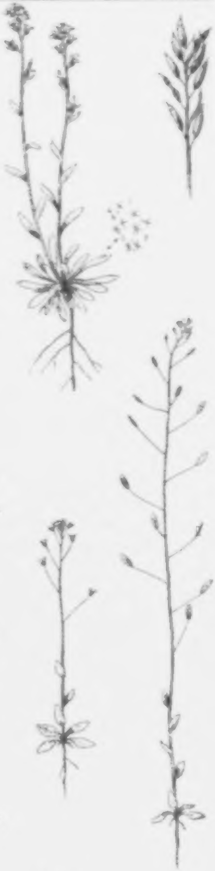
2. Annuals; flowers yellow, in open racemes. *D. nemorosa*

Perennials; racemes more contracted. 3

3. Blades with mostly many-branched (stellate) hairs; petals whitish; pod hairs stellate. *D. cana*

Blades with mostly 4-branched (cruciform) hairs; petals yellow; pod hairs simple to 2-forked. *D. aurea*

Draba aurea Vahl - Draba



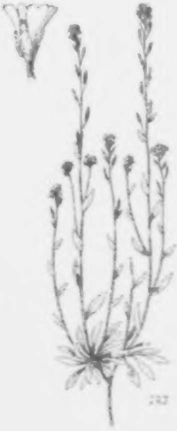
Growth Habit: **Perennials** 1-4 dm. tall, with several stems, these often basally reclining; stem hairs simple to variously forked.

Blades: Basal rosette with oblanceolate, often remotely toothed blades 1-4.5 cm. long; **hairs above and below 4-divided (cruciform); stem leaves 3-25**, sessile, **ovate, often toothed**.

Inflorescence: Flowers numerous, **yellow**, petals about twice as long as sepals, 4.5-6 mm. long; **pods lanceolate, to 2 cm. long, usually twisted, their hairs simple to 2-forked**; styles 0.3-1.5 mm. long.

Similar Species:

1. ***Draba nemorosa*** L. - Draba
   Our most widespread species, growing on disturbed soil, in open dry to moist places, usually requiring exposed soil.
   Distinguished as follows:
   - Annuals, with erect stems 0.3-3.4 dm. tall.
   - Blades lanceolate-obovate, toothed, to 4.5 cm. long, occurring on lower part of stem.
   - Leaf hairs simple to cruciform above, cruciform below, all long-stalked.
   - Flowers yellow, in open racemes; petals to 4 mm. long.
   - Fruit elliptic, to 1 cm. long, sometimes hairy, not twisted.



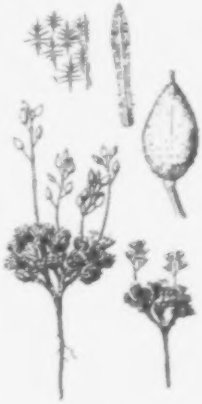
2. ***Draba cana*** L. - Draba
   Found from foothills to alpine sites in the Rocky Mountain region. Grows on exposed slopes.
   Differs from *Draba aurea*:
   - Plants somewhat smaller, to 2.5 dm. tall.
   - Some stem hairs usually much-forked (stellate).
   - Basal leaves oblanceolate, 1-3 cm. long, sometimes toothed.
   - Lowest leaves felty-hairy above and below with stellate hairs.
   - Stem leaves few (3-10), mostly toothed.
   - Flowers white.
   - Pods stellate-hairy.
   - Pods lanceolate-oblong, 4-12 mm. long, twisted.

3. ***Draba oligosperma*** Hook. - Draba

One of many small drabas at higher elevations, these mostly cushion-like, very attractive in spite of their size, and many difficult to positively identify. *D. oligosperma* is found on screes, on exposed slopes.

Distinguished as follows:

- Densely tufted cushion-like plants with leafless stems 2-6 (8) cm. tall.
- Leaves narrow (to 1 mm. wide), imbricate, with thickened veins on margins and midrib.
- Leaves with sessile many-branched (9 or more rays) hairs on surfaces, margins with a few simple hairs at base.
- Pedicels glabrous.
- Flowers yellow, pods 2-8 mm. long, elliptic, sometimes hairy.



Habitat & Distribution: Found in open woods, in disturbed places and those with naturally occurring exposed soil, on rocky slopes. Frequent throughout the Rocky Mountain region and at higher elevations in the southern boreal forest.

Forage Value: Poor, for all members of the genus.

Grazing Response: Increasers.

Notes: The generic name from *drabe*, by Dioscorides, translating acrid; the genus is well represented locally, however most species are alpine, a number of these rare; of those that occupy higher elevations many are very attractive, providing a splash of color in otherwise rather barren habitats; ornamental potential is considerable for rock gardens and other exposed sites; a problematic genus taxonomically, requiring both vegetative and reproductive (flowers and fruit) structures for positive identification.

ERYSIMUM L. - Mustard; Wallflower, Treacle

Common Characteristics

- Annual, biennial or perennial herbs, mostly over 2 dm. tall.
- Leaves alternate, not clasping, entire, with 2-3 (4)-branched hairs.
- Racemes of several yellow (purple in one alpine species) flowers.
- Pods linear, not flattened, 4-angled, the valves each with a strong nerve (keel).
- Styles and the broadly 2-lobed stigmas persistent as beaks.
- Seeds in 1 row, wingless.

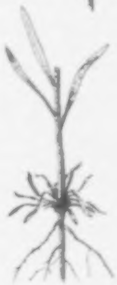
Key to Erysimum

1.	Plants essentially green, with 3-divided hairs on foliage; petals less than 5 mm. long, siliques to 3 cm. long; widespread, often weedy.	*E. cheiranthoides*
	Plants with grey-green foliage, the hairs mostly 2-divided.	2
2.	Petals showy, 15-25 mm. long; styles mostly exceeding 1.5 mm. long; sand species.	*E. asperum*
	Petals rather obscure, 6-12 mm. long; styles to 1.5 mm. long	*E. inconspicuum*

Erysimum inconspicuum (S. Wats.) MacM. - Small-flowered Rocket

Growth Habit: Short-lived perennial (biennial) from a **strong taproot**; **stems stiffly erect**, simple or few-branched, **grey-green, roughened and hairy with 2-3-branched hairs, distinctly angled, 2-6 dm. tall**.

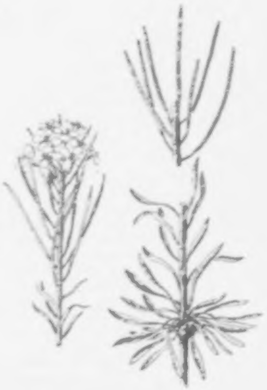
Blades: Linear-oblanceolate/lanceolate, **firm, 2-8 cm. long**, entire to slightly toothed, **grey-green** and **rough** with appressed **mostly 2-branched hairs**.



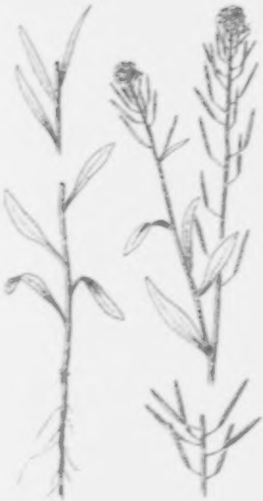
Inflorescence: Racemes elongate, with ascending stalks, these **conspicuously thickened**, widening at the tip; petals **pale yellow, 6-12 mm. long**; pods **slightly thicker than stalks**, **erect**, **2-5 cm. long**, **linear**, **with thick styles 0.5-1.5 mm. long**; stalks, sepals and pods short grey-hairy.

Similar Species:

1. ***Erysimum asperum*** (Nutt.) DC. - Prairie Rocket; Western Wallflower
   Found in sandy sites, in active dunes in the prairies, occasional in the parkland region.
   Differs as follows:
   - Blades larger, 3-12 cm. long.
   - Petals deeper yellow, much larger, 15-25 mm. long.
   - Pods often spreading, stout, 6-10 cm. long.
   - Styles beak-like, 2-3.5 mm. long.



2. ***Erysimum cheiranthoides*** L. ssp. ***cheiranthoides*** (introduced) and ssp. ***altum*** Ahti (native) - Wormseed Mustard
Common and widespread, often on disturbed sites.
Differs as follows:
- Annuals (winter annuals), stems simple to branched, 1.5-5 dm. tall, hairs 2-divided.
- Leaves green, narrow-lanceolate, often somewhat toothed, with 3-divided hairs.
- Racemes with spreading pedicels.
- Petals mostly to 4 mm. long, yellow.
- Siliques mostly erect and glabrous, to 3 cm. long.



Habitat & Distribution: Most common in foothills, montane and parkland regions, occasional elsewhere. A species of relatively dry, open areas, found in drier sites in fescue grassland, in open prairie grassland. Tolerant of moderate alkalinity.

Forage Value: Poor, all members of the genus, like many other mustards, containing distasteful acrid juices.

Grazing Response: Increasers.

Notes: *Erysimum*, from the Greek *Erusimon*, derived from *eryo*, to draw, as some members of the genus were applied as poultices and thought to draw out pain; also known as wallflower; some *Erysimum* species were used in a medicinal compound to counteract poison, hence the name treacle; of the three species found locally, *E. asperum* shows the most potential for propagation because of its ornamental properties and its ability to stabilize loose sandy soil in the prairie region.

LEPIDIUM L. - Peppergrass

Common Characteristics

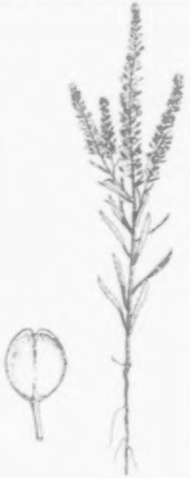
- Annuals to perennials, often weedy, hairs, when present, simple.
- Leaves entire to toothed or pinnatifid.
- Flowers in dense bractless racemes.
- Petals whitish, often shorter than sepals, sometimes lacking.
- Stamens 2, 4, or 6.
- Ovary with 2 ovules, styles short to obsolete.
- Fruit an orbicular/ovate-obovate silique, flattened at right angles to the septum.
- Valves of fruit keeled or winged, often notched at the apex.
- Seeds solitary in each locule, hanging from the apex.

Key to Lepidium

1. Plants with solitary stems, branched above; racemes terminal; siliques orbicular-obovate, widest above the middle, apical teeth rounded. *L. densiflorum*

Plants more branched from base; axillary and terminal racemes present; siliques elliptic-ovate, widest below the middle, apical teeth pointed. *L. ramosissimum*

Lepidium densiflorum Schrad. var. ***densiflorum*** - Common Peppergrass



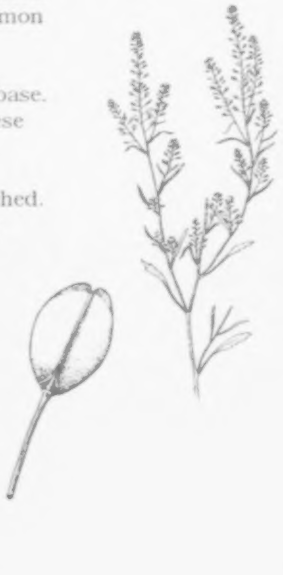
Growth Habit: Annuals or winter annuals, 2-5 dm. tall, with a solitary stem, this erect, **branched above**, **grey-green** from a dense, short pubescence.

Blades: Basal leaves petiolate, deeply toothed to pinnately lobed, upper leaves becoming sessile, linear-lanceolate, entire to somewhat toothed; blades grey-green pubescent.

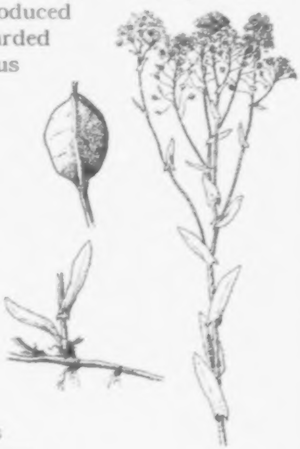
Inflorescence: **Racemes terminal, 5-15 cm. long, densely flowered**; sepals about 1 mm. long, **petals white, very short to absent; siliques obovate to oblong-obovate, widest above the middle, broadly rounded and winged at the apex, notched**, the styles mostly obsolete; pods **glabrous to pubescent**.

Similar Species:

1. ***Lepidium ramosissimum*** A. Nels. - Branched Peppergrass
   Found on dry slopes and in waste places. Also widely distributed but less common northward. Introduced.
   Differs as follows:
   - Plants often branched from the base.
   - Plants with axillary racemes (these sometimes short) as well as terminal ones.
   - Racemes often compound-branched.
   - Petals more often present, these shorter than sepals.
   - Pods finely hairy to ciliate, the apex more pointed, widest at or below the middle.



2. ***Cardaria chalepensis*** (L.) Handel-Mazzetti - Hoary Cress



One of three *Cardaria* species introduced locally, all very similar, and all regarded with increasing suspicion as noxious weeds, the creeping root systems capable of producing extensive, persistent mats.

Distinguished as follows:

- Perennials from rhizomes.
- Plants 1-5 dm. tall, branched, hairy.
- Blades oblong, toothed to entire, the upper ovate and sagittate-clasping.
- Racemes flat-topped, with numerous white flowers, petals 3-4 mm. long.
- Pods ovate-reniform, the bases tapered, fruit and sepals glabrous.

Habitat & Distribution: Common and widespread throughout the region. Found in dry, open places, especially common in waste and disturbed sites.

Forage Value: Poor, the plants stiff, stemmy and unpalatable for most of the season.

Grazing Response: An increaser (invaders in the case of non-natives), capable of producing large quantities of viable seed; under normal conditions in rangeland, however, peppergrass will not compete except in badly depleted pastures with considerable amounts of exposed soil.

Notes: From the Greek *lepis*, scale, alluding to the small seed pods; *Lepidium* species are generally considered nuisance weeds of gardens and waste places rather than noxious or invasive, and do, to a limited extent, function as pioneers on disturbances that ultimately become stabilized with better quality perennial species.

PHYSARIA A. Gray - Double Bladder-pod

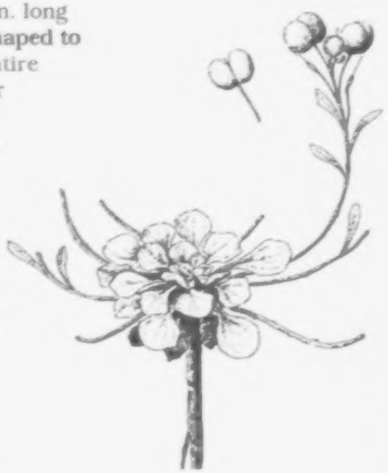
Key to Lesquerella

1.	Pedicels curved but not sigmoid ("s"-shaped); fruit globose; styles 3-5.5 mm. long	*L. arenosa*
	Pedicels sigmoid; fruit ovate; styles 2-4 mm. long	*L. alpina*

Physaria didymocarpa (Hook.) A. Gray - Double Bladder-pod

Growth Habit: Perennials from **a heavy taproot and a thick, often branched caudex**: stems simple, usually several, **reclining, to 1 dm. long, silvery, with star-shaped hairs**.

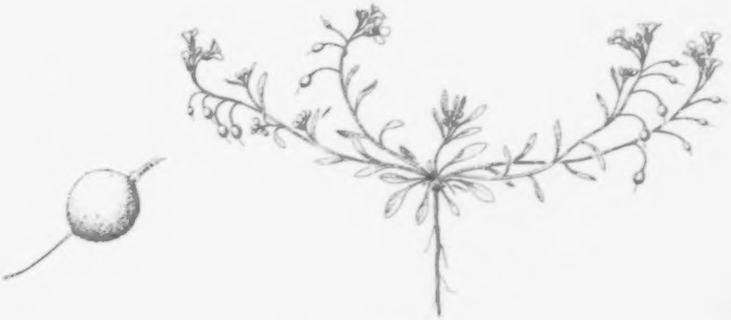
Blades: Basal blades **numerous**, 2-8 cm. long and **to 4 cm. broad, spatula-shaped to broadly oblanceolate**, blunt, entire to toothed; cauline leaves **fewer and reduced** upward; foliage **silvery, with star-shaped hairs**.



Inflorescence: Racemes with **ascending to curved stalks**; sepals hairy, petals **yellow, 8-12 mm. long**; pods **conspicuously inflated, hairy, 1-2 cm. long and about as broad, 2-lobed (didymous), slightly cordate-based**; styles persistent, 7-9 mm. long, seeds 3-4 per compartment.

Similar Species:

1. ***Lesquerella arenosa*** (Richards) Rydb. var. ***arenosa*** - Sand Bladder-pod
   Frequent in foothills and parkland regions, less common in the prairies. Grows in dry, often sandy grassland, on exposed slopes and hillsides.
   Differs as follows:
   - Tufted (annuals) short-lived perennials, to 2.5 dm. tall.
   - Plants more grey-green, with star-shaped hairs.
   - Blades narrower, oval-oblanceolate, 1-6 cm. long.
   - Petals yellow (often pink-tinged), about 7 mm. long.
   - Pods rounded, not inflated, 3-4 mm. long, the styles 3-5.5 mm. long.



2. ***Lesquerella alpina*** (Nutt.) S. Wats. ssp. ***alpina*** - Bladder-pod

Frequent in the southern prairie region. Grows in dry, exposed places: on dry slopes and badlands, on dry plains. Differs from *L. arenosa* as follows:

- A more caespitose, longer-lived species from a simple to thick, well-branched caudex.
- Plants more grey-silvery than grey-green.
- Blades generally narrower, oblanceolate to narrowly obovate.
- Petals more uniformly yellow.
- Pedicels often "s"- shaped (sigmoid).
- Siliques more ovate, the style 2-4 mm. long.

Habitat & Distribution: Common in but restricted to the southern foothills and Rocky Mountains. Grows on dry banks and slopes, on shale and talus slopes, in gravelly places.

Forage Value: Poor, unpalatable and providing very little forage.

Grazing Response: Increasers, although not aggressive or troublesome, and usually occupying sites regarded as marginal grazing land.

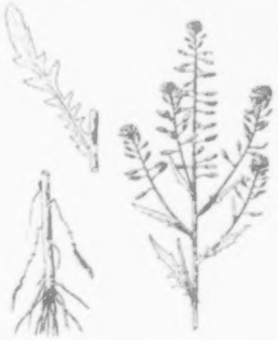
Notes: One of 14 species native to N. America, these primarily restricted to drier montane habitats; *Physaria* means bellows, referring to the inflated pod valves; the specific name from didymous, meaning in pairs, alluding to the 2-lobed pods; the species was used by the Blackfoot people, taken internally for sore throats, cramps, and stomach disorders, boiled material also applied to reduce swellings; double bladder-pod is an excellent ornamental for rock gardens and other dry sites, the foliage, flowers and pods all very attractive.

RORIPPA Scop. - Yellow Cress

Common Characteristics

- Annual, biennial or perennial herbs of wet to moist habitats.
- Plants glabrous or with a few simple hairs, not glaucous.
- Blades simple to pinnately divided.
- Racemes ebracteate, with small mostly yellow flowers.
- Siliques relatively short, oval to short-cylindric, mostly terete, the valves 1-nerved.
- Styles often short, persistent, stigmas 2-lobed.
- Seeds usually irregularly biseriate.

Rorippa palustris (L.) Besser ssp. ***palustris*** - Yellow Cress



Growth Habit: Annuals or biennials with fibrous roots; stems 2-6 dm. tall, usually freely branched, ridged, glabrous above, often sparsely pubescent below; **hairs not forked**.

Blades: Lower blades petiolate, **oblong-lanceolate in outline, deeply lyrate-pinnate, the divisions incised**; upper blades somewhat reduced, sessile, less deeply divided, auriculate; blades gabrous below, sometimes sparsely hairy (especially on midribs) above.

Inflorescence: Racemes with numerous flowers; **pedicels 3-12 mm. long, about equalling fruits; petals shorter than the early deciduous sepals, about 2 mm. long, pale yellow; pods ovoid-oblong, 3-8 mm. long**, often slightly curved; styles about 1 mm. long.

Related Species:

1. Ssp. ***hispida*** (Desv.) B. Jonsell
   Differs as follows:
   - Stems spreading-hairy.
   - Blades hairy below.
   - Pods short-ovoid, less than 6 mm. long.

Habitat & Distribution: Common throughout most regions. Grows in wet to moist places: on shores, on prairie mud flats, in marshy and swampy areas.

Forage Value: Poor, possibly utilized to some extent in early spring but overall of little value to grazing animals.

Grazing Response: An increaser.

Notes: Syn. *R. islandica*; the generic name is derived from *rorippen*, the Saxon name for the plant; yellow cress is not clearly separated from the introduced, white-flowered *Nasturtium officinale*, or water cress, the familiar salad green which can now be found in streams in montane regions; wild mustards of moist habitats function to some extent in providing vegetation cover, and in binding loose, wet soil along streams and around ponds.

DROSERACEAE - Sundew Family
DROSERA L. - Sundew

Common Characteristics

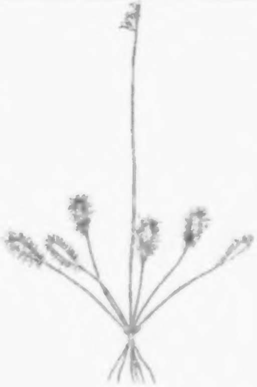
- Small perennials, insectivorous.
- Leaves glandular-viscid, in basal rosettes, stalked.
- Leaves with fringes of long reddish glandular hairs, these secreting viscid drops that attract, catch and digest insects.
- Flowers on naked scapes, 3-10 in nodding clusters.
- Flowers perfect, parts 4-8, the pistil of 3-5 united carpels.
- Styles 3-5, 2-divided.
- Fruit a many-seeded capsule, with spindle-shaped seeds.

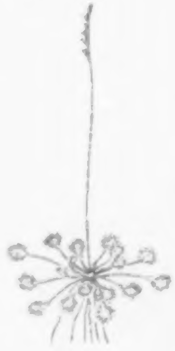
Key to Drosera

1. Leaves narrowly obovate/elongate-spatulate. *D. anglica*

Leaves as broad or broader than long, orbicular/broad-ovate. *D. rotundifolia*

Drosera anglica Huds. - Sundew





Growth Habit: Scapose perennials to 20 cm. tall.

Blades: Leaves mostly erect, **often reddish**, with petioles 2-6 cm. long, **narrowly obovate-spatulate**; blades 3-4 mm. broad, 1-3 cm. long, **covered with viscid hairs, with longer tentacles on margins**; stipules fringed above.

Inflorescence: Scapes erect; sepals about 5 mm. long, flowers white, about 6 mm. long; capsules 5-7 mm. long, with black spindle-shaped seeds; **flower stalks uncoil as scape matures**, flowers open only in sunlight.

Similar Species:

1. ***Drosera rotundifolia*** L. - Sundew
   A boreal species, ranging throughout the southern and northern boreal forest. Found in fens and sphagnum bogs.
   Differs as follows:
   - Leaves orbicular/broadly ovate, as broad as or broader than long.

Habitat & Distribution: Found throughout the boreal forest in swamps, bogs, and is also known for somewhat more nutrient-rich graminoid fens, associated with sedges and buck-bean.

Forage Value: Poor.

Grazing Response: Increasers strictly speaking, although mostly occurring in marginal grazing areas.

Notes: *Drosera*, in Greek, translating dew, describing the fluid-filled hairs on the leaves; sundews are adapted to supplement their nutrient requirements, both to compensate for lack of sunlight (because of low growth and also climatic considerations) and the nutrient-poor bogs in which they typically occur; this is accomplished by means of trapping, then enclosing small insects in their leaves, and digesting all but the exoskeleton of their prey; human fascination with the genus has prompted belief that plants protect against witchcraft, and act as a love charm; medicinal uses have been numerous, a natural antibiotic derived from them effective treatment for strep, staph and pneumonia; it is listed as a stimulant, expectorant, antispasmodic and demulcent, used primarily as a remedy for respiratory problems; taken internally, tinctures can act as irritants, and externally they can cause blistering.

CRASSULACEAE - Stonecrop Family

Common Characteristics

- Perennial (ours) herbs or shrubs, often rhizomatous.
- Leaves succulent, simple, exstipulate, alternate or opposite.
- Flowers regular, usually in cymes, hermaphroditic (sometimes dioecious), hypogynous to perigynous.
- Flowers 4-5-merous (rarely more).
- Calyx slightly connate-based, petals free or connate-based.
- Stamens equalling or twice as many as petals; anthers 2-celled.
- Pistils equalling petals, 1-carpellary, free or basally united, each with a nectary at the base.
- Styles often elongated, beak-like.
- Fruit a capsule or ventrally dehiscent follicle.

Key to Crassulaceae

1. Petals red-purple; flower parts in 4's or 5's; flowers sometimes imperfect. *Tolmachevia*

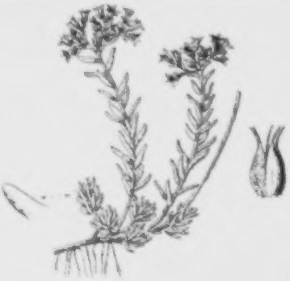
Petals yellow; flower parts in 5's; flowers perfect. *Sedum*

SEDUM L. - Stonecrop

Common Characteristics

- Perennial herbs, usually rhizomatous or stoloniferous.
- Blades cauline, opposite or alternate, simple, succulent, often terete.
- Flowers hypogynous, in cymes, perfect, yellow.
- Perianth in 4's or 5's, the sepals united below, the petals free to connate.
- Stamens 8 or 10, sometimes joined to the petals below.
- Carpels equalling petals, free or basally united.
- Fruit of follicles, seeds numerous.

Sedum lanceolatum Torr. - Common Stonecrop



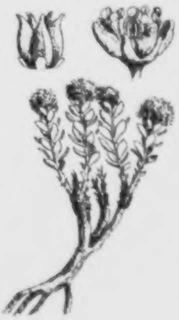
Growth Habit: Glabrous perennials, tufted, from rhizomes; fertile and sterile shoots present; **stems 5-15 cm. tall**.

Blades: **Leaves alternate, 3-12 mm. long, linear-lanceolate, succulent, subterete, slightly flattened**, minutely papillose; upper leaves soon scarious-brownish and deciduous, **those toward base and on sterile shoots green (these crowded)**.

Inflorescence: **Flowers 5-merous**, in rather dense, branched cymes; sepals triangular-lanceolate, **petals bright yellow**, about twice as long as sepals (6-9 mm.), lanceolate, not joined; **flowers rarely replaced by bulblets**; follicles erect, united at the base, the styles erect to divergent.

Similar Species:

1. ***Tolmachevia integrifolia*** (Raf.) Love & Love - Stonecrop
   Found on moist ridges, on scree slopes in subalpine and alpine areas. Distinguished as follows:
   - Perennials from branching rootstocks, with a multiple, scaly, thick caudex.
   - Annual stems to 15 cm. tall.
   - Leaves oblong, sometimes toothed, small.
   - Inflorescence with some perfect and some unisexual flowers, of dense cymes.
   - Flowers red-purple, petals about twice sepal length.
   - Follicles red-purple, divergent.



Habitat & Distribution: Common in the foothills, southern Rocky Mountains and in Cypress Hills, where found from lowland to alpine elevations. Grows on dry, open hillsides and slopes, on rocky outcrops and ridges, on sandy or gravelly, exposed places.

Forage Value: Poor; *Sedum* is one of only a few species of our northern latitudes having succulent foliage, possibly grazed as a source of water in extremely dry conditions, but small and unproductive by comparison to larger desert succulents, also restricted by specific habitat requirements and thus confined to a few ecosite types, and rarely with high cover values.

Grazing Response: An increaser, but not aggressive, also restricted to dry, exposed and often sparsely vegetated sites.

Notes: Syn. *S. stenopetalum*; the Latin term for the generic name is *sedeo*, to sit, alluding to the low growth habit; one of a large group of over 400 species, a few of these rare natives, others rather spectacular, and cultivated as ornamentals; a most fascinating observation is a glimpse of the beautiful parnassian butterfly (*Parnassius smintheus*) in dry montane regions, for which *S. lanceolatum* is the exclusive host plant and thus essential to the survival of the butterfly species; stonecrop is edible, also has astringent properties, useful in treating diarrhea, skin ulcerations and wounds.

SAXIFRAGACEAE - Saxifrage Family

Common Characteristics

- Perennial herbs, sometimes slightly woody at base.
- Blades mostly simple and alternate (or basal).
- Flowers mostly perfect and regular, solitary, in cymes, or in racemes.
- Hypanthium usually evidently developed.
- Sepals usually 5, separate or united at base.
- Petals usually 5, not united, lacking in a few species.
- Stamens usually the same number or twice as many as petals.
- Ovary usually inferior.
- Styles and stigmas 2.
- Fruit dry, a capsule or follicle.

Key to Saxifragaceae

1. Petals lacking; sepals 4; stamens 2-8. *Chrysosplenium*

Petals mostly present, sepals 5; stamens 5 or 10. 2

2. Stamens 5. 3

Stamens 10. 4

3. Petals 3-divided or pinnatifid. *Mitella*

Petals entire or absent. *Heuchera*

4. Petals pinnatifid. *Mitella*

Petals entire. 5

5. Petals relatively broad; capsule valves mostly equal in size. *Saxifraga*

Petals linear; capsule valves unequal. *Tiarella*

Key to Saxifraga

1. Flowers yellow; of moist places. *S. aizoides*

Flowers not yellow; of open slopes. 2

2. Basal leaves narrow lanceolate, spiny-margined but otherwise entire; cauline leaves present. *S. bronchialis*

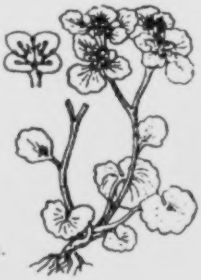
Basal leaves without spiny margins, but toothed, ovate-oblong; cauline leaves absent. *S. occidentalis*

CHRYSOSPLENIUM L. - Golden Saxifrage

Common Characteristics

- Small stoloniferous perennials.
- Blades opposite or alternate, round-reniform, petiolate, crenate.
- Stems freely rooting, mat-forming.
- Flowers cymose to solitary, subtended by large leafy bracts, terminating the short stems.
- Sepals 4 (5), small, petals absent.
- Stamens 4-8, alternating with small glands.
- Ovary about half inferior, of 2 carpels.
- Styles 2, not united, stigmas pitted.
- Capsules flattened, 2-lobed, about half inferior.
- Seeds usually numerous, smooth.

Chrysosplenium iowense Rydb. - Golden Saxifrage



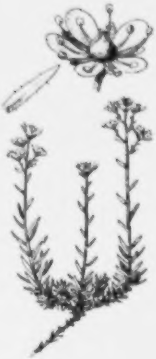
Growth Habit: Plants with shallow fibrous roots, **spreading by leafy stolons**; stems mostly erect, slender, glabrous or with a few sparse hairs, **3-15 cm. tall**.

Blades: **Leaves reniform-orbicular, 5-20 mm. wide, toothed**, veiny above when fresh, **often with a few stiff hairs on both surfaces**; petioles 1-3.5 cm. long, glabrous or pubescent with reddish hairs; cauline blades several, glabrous.

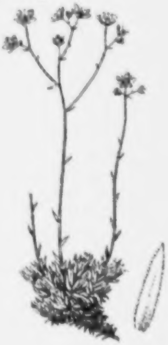
Inflorescence: **Leafy bracts fan-shaped/ovate, yellow, lobed; sepals 4, yellow**, 3-nerved, **one pair** (outer) **definitely wider** (not so evident in lateral flowers); **stamens 5-8 in central flowers, 2-4 in lateral**; styles 0.3-0.4 mm. long; capsules about equalling sepals; seeds brownish.

Other Species:

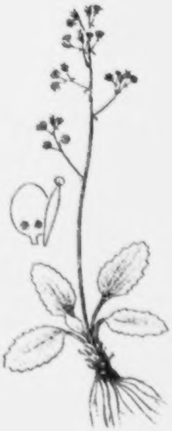
1. ***Saxifraga aizoides*** L. - Saxifrage
   One of many species in the genus, *S. aizoides* more likely encountered than most, occurring at lower elevations where found as a common shoreline species along streams in the Rocky Mountain region.
   Distinguished as follows:
   - Plants mat-forming.
   - Leaves basal and cauline, linear-oblong, to 8 mm. long, succulent/firm.
   - Leaves with spine tips, often also with a few marginal spines.
   - Flowers yellow, on glandular to glabrous stems to 10 cm. tall.
   - Petals about 4 mm. long, the tips fringed.



2. ***Saxifraga bronchialis*** L. ssp. ***austromontana*** (Wieg.) Piper - Saxifrage
   Common from montane to alpine elevations, found on rocky slopes.
   Distinguished as follows:
   - Matted plants with prostrate, leafy stems.
   - Leaves narrow-lanceolate, acuminate and with spiny margins and tips, 5-15 mm. long.
   - Flower stalks with a few reduced leaves, often glandular.
   - Flowers several, petals white and with red spots, longer than sepals.



3. ***Saxifraga occidentalis*** S. Wats. - Saxifrage
   Locally one of the most common of several similar species (these at times difficult to distinguish taxonomically). Found from montane to alpine areas on open or moist slopes.
   Distinguished as follows:
   - Leaves basal, oblong, crenate, with broad petioles; green above and with rusty hairs below; apex pointed.
   - Scapes 6-20 cm. tall, glandular.
   - Flowers in cymes, at maturity open-corymbose.
   - Sepals obtuse, petals whitish, to 3 mm. long.
   - Filaments broadened-petaloid.



Habitat & Distribution: Common in the boreal forest and foothills regions. Found in moist, shaded places: boggy woods, along streams, on wooded banks, in marshy areas.

Forage Value: Poor, of no importance as range plants.

Grazing Response: Increasers, but not invasive in any way, also restricted by habitat requirements, and surviving only where vegetation cover is rather sparse.

Notes: From the Greek *chrysos*, gold, and *splen*, spleen, this because of some belief that the plants have medicinal and healing properties although this has not been verified; the rather unremarkable golden saxifrage is much more common than most of the more spectacular members of the saxifrage family, many of these encountered primarily at high elevations.

HEUCHERA L. - Alum-root

Common Characteristics

- Perennial herbs from thick, scaly rootstocks and branched crowns.
- Blades basal, long-stalked, rounded, cordate-based, palmately lobed and toothed.
- Inflorescence usually narrow, terminating long, naked stems.
- Calyx greenish-yellow to purplish, shallowly saucer-shaped to more or less tubular.
- Petals 5, small, sometimes absent.
- Stamens 5.
- Ovary usually half inferior.
- Capsules with 2 spreading beaks, opening along the beaks.
- Seeds numerous.

Key to Heuchera

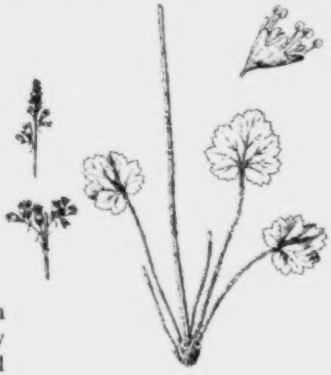
1. Calyx 2.0-3.0 mm. long; stamens not exserted. *H. parvifolia*

Calyx more than 4.5 mm. long. 2

2. Petals yellowish (or absent), shorter than sepals; stamens not exserted. *H. cylindrica*

Petals pink, glandular, as long as sepals; stamens exserted. *H. richardsonii*

Heuchera richardsonii R. Br. - Alum-root



Growth Habit: Plants from **thick, scaly, woody roots**, these sometimes short-rhizomatous; stems **3-6 dm. tall, bristly-hairy with stiff, spreading white hairs**, and also **glandular, especially above**.

Blades: Blades on **long white-bristly-hairy/glandular stalks**, 3-6 cm. wide, **ovate-kidney-shaped and cordate**, 5-7 (9) lobed and again shallow-toothed; **roughened on both surfaces**, usually rough-bristly-hairy below and on margins, **the marginal hairs not spiny**.

Inflorescence: Inflorescence glandular, panicles narrow, somewhat interrupted and elongating, flowers short-stalked; floral bracts **glandular, lacerate-fringed**, pale-margined; calyx **6-9 mm. long, densely glandular-hairy; petals present, purplish**, about as long as sepals, **glandular-hair-fringed; stamens conspicuously exserted**; capsules not exserted.

Similar Species:

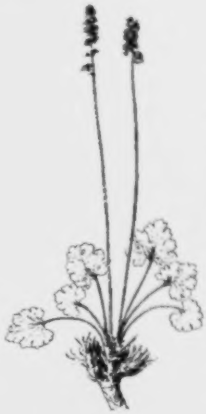
1. ***Heuchera cylindrica*** Doug. *ex* Hook. - Sticky Alum-root
   Restricted to the southern foothills and montane ecoregions, found in open grassland and often on rather exposed, rocky or talus slopes. Differs as follows:
   - Blades more often hairless and smoother on the surfaces.
   - Blades with small, spiny hairs on margins.
   - Sepals pale yellow.
   - Petals absent, or pale and short.
   - Stamens not exserted.
   - Capsule beaks exserted from calyx.

2. ***Heuchera parvifolia*** Nutt. *ex* T. & G. - Alum-root

Grows on open, often gravelly slopes in southern regions and Cypress Hills.

Differs as follows:

- Somewhat more slender plant 2-4 dm. tall.
- Blades smaller, 1-3 cm. broad, often glandular-pubescent, especially below.
- Panicles somewhat elongated and interrupted.
- Hypanthium broader, saucer-shaped.
- Calyx 2-3 mm. long.
- Stamens not exserted.
- Petals short, yellowish-white.



Habitat & Distribution: Common in the parkland region, occasional elsewhere. Found in prairie grassland, especially in sandy soil, on rocky and gravelly areas, on moist or rocky shores.

Forage Value: Poor, providing little forage and unpalatable to livestock, the herbage mildly stinging-astringent; deer and elk have been known to eat the foliage, and sheep to crop the flowers.

Grazing Response: Increasers, primarily because of unpalatable foliage, some species (*H. cylindrica*) also occupying habitats often inaccessible to animals.

Notes: The genus is named for Johann Heinrich von Heucher, 1677-1747, a professor of medicine at Wittenburg; alum-root refers to the astringent quality of the roots; *Heuchera* species are known for their medicinal value, root decoctions used as astringents and antiseptics and to cure diarrhea, poultices of foliage used for sores, swellings, cancer, and on horses for saddle sores; native alum-roots are well adapted as rock garden species, although introduced relatives are considerably more showy.

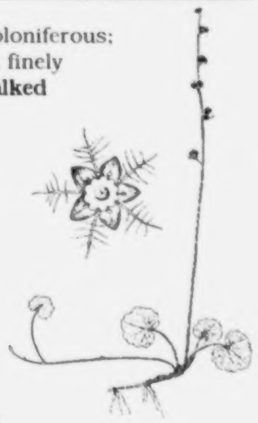
MITELLA L. - Bishop's-cap; Mitrewort

Common Characteristics

- Low growing rhizomatous herbs.
- Blades mostly basal, shallowly lobed or toothed, rounded in outline, cordate.
- Stems leafless or with 1-3 reduced leaves.
- Racemes spike-like.
- Calyx saucer-shaped, basally joined to ovary, with 5 free, short lobes.
- Hypanthium shallow.
- Petals 5, either trifid or pinnatifid.
- Stamens 5 or 10, not exserted.
- Capsules 2-valved at apex.
- Seeds few, numerous, shining, dark brown-black.

Mitella nuda L. - Bishop's-cap; Mitrewort

Growth Habit: Plants from long slender rhizomes, also stoloniferous; stems slender, erect, **leafless, 3-20 cm. tall**, finely glandular-pubescent, **usually with some stalked reddish glands**.

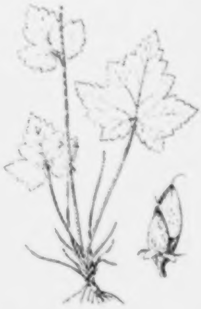


Blades: **Blades rounded-reniform and cordate, 1-3 cm. long, shallowly lobed and crenate, sparsely pubescent with stiff white hairs**, petioles long, **glandular-pubescent**.

Inflorescence: **Racemes narrow, with 3-12 widely spaced flowers**; calyx broadly bell-shaped to saucer-shaped, **with 5 ovate lobes about 1.5 mm. long, greenish**; hypanthium joined to the base of ovary, with almost no free portion; **petals conspicuously exserted, deeply pinnate into linear segments, greenish-yellow; stamens 10**, styles about 0.5 mm. long, somewhat divergent; seeds rather few, **black, shining**.

Other Species:

1. ***Tiarella unifoliata*** Hook. - False Mitrewort
   One of a number of species in the saxifrage family occurring at higher elevations, many of which are very beautiful but rare and restricted to these regions. *T. unifoliata* is relatively common, found in moist woods in the Rocky Mountains and at higher altitudes in the boreal forest.
   Distinguished as follows:
   - Plants from scaly rootstocks, stems slender, 1-4 dm. tall.
   - Stems glandular above, sometimes hairy below.
   - Leaves 1-4, broad/cordate and 3-5 lobed, crenate and with sharp-pointed teeth, to 8 cm. long, usually broader than long.
   - Blades rough-hairy to glabrous.
   - Sepals about 2 mm. long, white to pink-tinged.
   - Petals white, linear, longer than sepals.
   - Stamens 10, conspicuously exserted.
   - Capsules with 2 very unequal valves, these 9-12 mm. and 4-6 mm. long.



Habitat & Distribution: Common in all but the driest regions. Found in moist rich deciduous and mixedwood forests; along streams and in bogs, in cool, mossy, shaded places.

Forage Value: Poor for *M. nuda*; there are some indications that mitreworts as a group make fair quality forage, this more applicable to larger montane species that can provide some herbage when growing under optimum conditions.

Grazing Response: Increaser in woodlands.

Notes: The generic name comes from the Latin *mitre*, cap, alluding to the shape of the capsule (as does the common name "bishop's-cap"); although small and thus often overlooked by the casual observer, mitreworts have a unique and fascinating flower structure; some of our more common and hardy species perform well in cool, shaded gardens.

PARNASSIACEAE - Grass-of-parnassus Family
PARNASSIA L. - Grass-of-parnassus

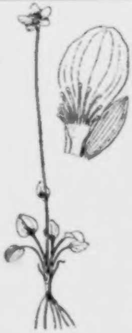
Common Characteristics

- Glabrous perennials with rootstocks.
- Blades basal or near base, and often one sessile cauline blade.
- Flowers solitary, terminal.
- Sepals 5-lobed, petals 5, white and usually yellow-green-veined.
- Staminodia present, in 5 united clusters, alternating with the 5 stamens, opposite petals.
- Ovary mostly superior, 1-loculed, with 4 parietal placentae.
- Stigmas 4, styles nearly obsolete.
- Fruit an ovoid 4-valved capsule.
- Seeds numerous, angled, reticulate.

Key to Parnassia

1.	Leaves broad, reniform-cordate; petals fringed along sides.	*P. fimbriata*
	Leaves ovate, cordate-based; petals not fringed.	*P. palustris*

Parnassia palustris L. - Grass-of-parnassus



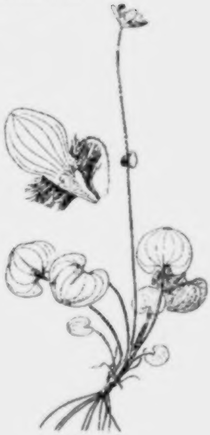
Growth Habit: Plants from short or sometimes elongating rootstocks; stems 1-several, 1-2.5 (3) dm. tall, **bladeless except for 1 cordate-clasping, ovate leaf near the middle**.

Blades: Blades mostly basal, glabrous, **broadly ovate and usually cordate-based, 10-20 mm. long**, on petioles mostly 1-4 times as long as blades.

Inflorescence: Calyx lobes oblong-lanceolate, entire, about half as long as petals; **petals entire, white, with 5-9 greenish-yellow veins; staminodia 7-15 per scale**, the segments slender, capped with glandular knobs; capsules 10-12 mm. long, ovoid.

Similar Species:

1. ***Parnassia fimbriata*** Konig - Grass-of-parnassus
   More restricted to the foothills/southern Rocky Mountain regions. Found in moist springy places, on stream banks.
   Differs as follows:
   - Leaves broader, reniform-cordate.
   - Petals conspicuously fringed along sides.



Habitat & Distribution: Common throughout all but driest regions. Found in wet to moist shaded places: along streams, in boggy woods, near springs and seepages.

Forage Value: Poor.

Grazing Response: Increasers.

Notes: The generic name originates from some connection to Mt. Parnassus in Greece, *palustris* means of marshes; the value of grass-of-parnassus lies primarily in its aesthetic appeal, *P. fimbriata* in particular a prized species for use in moist, shaded gardens; the strategy used by members of the genus to ensure insect pollination is both interesting and deceptive: at least one insect species (a fly, *Lucilia*) is attracted to the flower because the false nectaries at the tips of the staminodia appear as if they contain nectar.

ROSACEAE - Rose Family

Common Characteristics

- Herbaceous (annuals to perennials) or woody plants.
- Blades stipulate, alternate, simple to compound.
- Flowers perfect, regular, solitary or in cymes or racemes.
- Calyx 5-lobed, often alternating with 5 small bracts (bracteoles).
- Petals 5, separate.
- Stamens usually numerous.
- Ovaries inferior or superior.
- Fruit variable: of achenes, follicles, or fleshy (pomes, drupes, drupelets).

Key to Herbaceous Rosaceae

1. Inflorescence in a spike-like raceme; hypanthium with hooked prickles, carpels 2. *Agrimonia*

Hooked prickles absent, carpels 5 or more. 2

2. Glandular hairy plants with finely (2-3 ternate) divided leaves; petals white, small, not exceeding sepals; stamens 5; carpels 5-10; of sandy/gravelly places. *Chamaerhodos*

Petals mostly exceeding sepals; stamens 10 or more; carpels 10 or more. 3

3. Plants with stolons; petals white; fruit a fleshy red strawberry. *Fragaria*

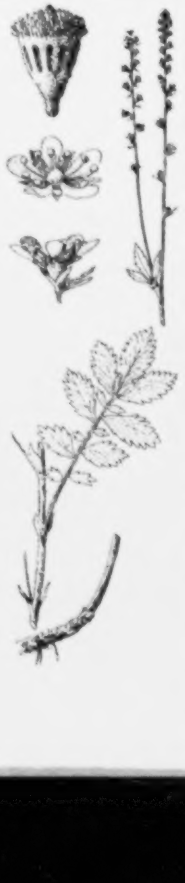
Petals yellow or pink. 4

4. Flowers yellow (rarely purple or white); styles breaking off, not persisting in fruit, not hooked or feathery. *Potentilla*

Flowers yellow or red-pink; styles persistent on seeds, either hooked at the end or feathery. *Geum*

AGRIMONIA L. - Agrimony

Agrimonia striata Michx. - Agrimony



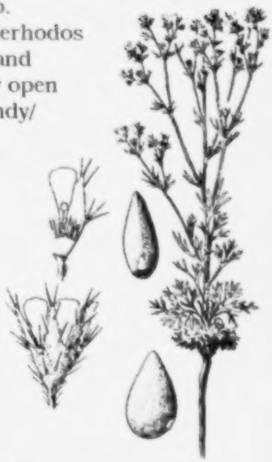
Growth Habit: Perennial herbs from stout scaly rhizomes and fibrous roots; stems 5-10 dm. tall, **hairy with yellow-brownish hairs, often also glandular above**.

Blades: **Leaves interrupted pinnate, with 5-9 large leaflets** (the upper largest, to 6 cm. long) **and small interspersed leaflets**; leaflets lanceolate-oblanceolate, **sharply serrate**, green and glabrous to sparsely hairy above, **much paler, veiny, glandular and hairy below**; cauline leaves well developed; **stipules conspicuous, to 2 cm. long, usually serrate**.

Inflorescence: Racemes terminal, **spike-like**, 5-20 cm. long; floral bracts 3-toothed; mature hypanthium conic, 10-grooved, glandular-dotted, **with several rows of hooked prickles at apex**; sepals spreading and incurved at maturity; **petals yellowish, only 3 mm. long**; stamens few, 5-15; **carpels 2**, enclosed by hypanthium; fruit of 2 achenes, enclosed in hypanthium.

Other Species:

1. ***Chamaerhodos erecta*** (L.) Bunge ssp. ***nuttallii*** (Pickering) Hult. - Chamaerhodos
   Found throughout prairie, parkland and foothills regions on dry slopes, in dry open places. Especially associated with sandy/gravelly soils.
   Distinguished as follows:
   - Biennials from taproot
   - Mature plants 1-3 dm. tall, glandular/hirsute, hairs glossy.
   - Blades in a rosette the first year, more erect and cauline by the second year.
   - Leaves feathery-dissected (2-4 ternate), the upper reduced, sessile.
   - Flowers numerous, small, white, in leafy-bracted cymes.
   - Petals about as long as sepals, white.
   - Stamens 5, ovaries 5-10, superior.
   - Achenes brown, ovoid.



Habitat & Distribution:

Common in the parkland region. Also in Cypress Hills. Grows in open woods, willow thickets, in clearings, in small aspen groves. Associated with rich, moist sites.

Forage Value:

Poor to fair, as with most herbaceous members of the rose family, utilization is typically light except in cases where the forage supply is depleted.

Grazing Response:

Increasers, but never very abundant under normal conditions.

Notes:

Agrimonia is Latin for the Greek *agemone* or *agemonia*, poppy, this traced to a Hebrew term translating red-purple, obviously a reference to a species of another continent; environmentally, species like agrimony are important, having soil building and binding properties, contributing to the overall floristic diversity but at the same time not threatening the stability of native ecosites in cases of site deterioration; *Chamaerhodos* is of special interest as a short-lived, early phase species, important in stabilizing sandy slopes prone to erosion; its tough, woody root system is able to withstand considerable trampling.

FRAGARIA L. - Strawberry

Common Characteristics

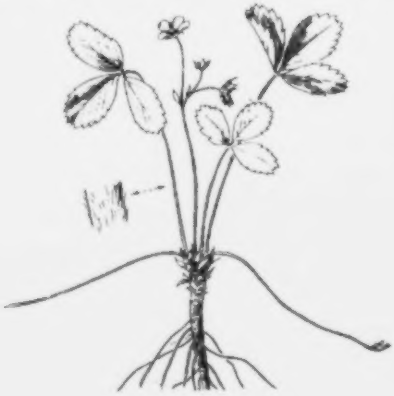
- Stemless perennial herbs with short scaly rhizomes.
- Plants strongly stoloniferous, the stolons freely rooting and producing new plants.
- Leaves basal, long-stalked, with 3 nearly stalkless coarsely toothed leaflets.
- Flowers usually several, long-stalked, with leaf-like bracts below.
- Petals, sepals, and bracteoles each 5.
- Petals white, longer than sepals.
- Fruit a red fleshy strawberry, with small achenes imbedded.

Key to Fragaria

1. Leaf teeth ascending, the terminal one shorter than adjacent lateral ones; upper leaf surface glabrous; inflorescence shorter than leaves. *F. virginiana*

Leaf teeth divergent, the terminal one longer than adjacent teeth; upper leaf surface with some hairs; inflorescence extending beyond leaves. *F. vesca*

Fragaria virginiana Duchesne ssp. ***glauca*** (S. Wats.) Staudt. - Wild Strawberry



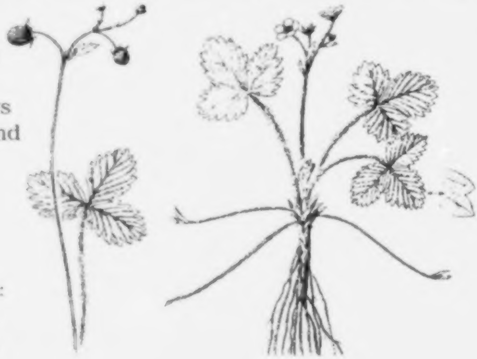
Growth Habit: Plants with dark scaly rhizomes and **long, freely rooting and often reddish stolons**; stems up to 15 cm. long, stems and stolons with appressed to spreading hairs.

Blades: **Leaflets 3**, on very short stalks, **oval-obovate, usually wedge-shaped, sharply toothed**, with ascending teeth, the **terminal tooth shorter than the two adjacent ones**; leaflets 2-7 cm. long, **blue-green and hairless above, paler and hairy below**; stalks hairy, long, **at maturity exceeding inflorescence**; stipules often reddish-tinged.

Inflorescence: Flowers several, calyx and bracteoles silky-hairy, the sepals longer and broader, long-pointed; **petals white, 6-13 mm. long**; achenes sunken about 3/4 their width into a **red fleshy strawberry**.

Similar Species:

1. ***Fragaria vesca*** L. - Woodland Strawberry
   Found rather sporadically throughout the parkland and boreal forest regions. Also a disjunct population in the southern Rocky Mountains. Grows in moist mixed and coniferous forests, in drier, often sandy or rocky woods.
   Differs as follows:
   - Blades more yellow-green, usually with some silky hairs above.
   - Blades pale and somewhat glaucous below but not net-veined.
   - Leaf teeth more spreading, the terminal one projecting beyond the adjacent lateral ones.
   - Inflorescence longer than blades at maturity.
   - Petals smaller, to about 1 cm. long.
   - Achenes more shallowly sunken on mature receptacle.



Habitat & Distribution:

Very common throughout most regions. Absent only from very dry sandy areas and those with poor soils in the prairies. Found in fescue grassland, open woods, along sandy and gravelly stream banks, river flats, in depressional areas and moist coulees in the prairie region. Also persists following encroachment of climax forest cover, frequently occurring as part of the often sparse understory composition.

Forage Value:

Poor, considered worthless as a grazing species for cattle because of low growth habit and low palatability; plants are utilized to some extent by elk, deer, and sheep, although overall the species produces relatively low yields.

Grazing Response:

An increaser, very resistant to heavy grazing and trampling, the low, reclining growth habit and production of abundant runners giving the species both an adaptive and reproductive advantage; strawberry is often associated with Kentucky bluegrass and dandelion on overgrazed, altered range.

Notes: From *fraga*, the Latin name for strawberry, the specific name suggesting the centre of distribution in the Atlantic states; the term "strawberry" originates with the Anglo-Saxon phrase "strews" or "straws", as the fruit appears to be "strewn" on the ground; strawberries were a prized delicacy among native people, eaten raw, but considered too juicy to preserve; the Cree Indians made a tea from the roots and combined this with yarrow as a supposed cure for insanity; as well, leaves were infused to make tea, and a root decoction taken to cure diarrhea; the Hand Hills, Alberta, were at one time called "Strawberry Hills" by the Blackfoot Tribe; a pioneer on disturbances, and spreading rapidly by runners, *F. virginiana* is of some importance in stabilizing soils while climax grasses establish.

GEUM L. - Avens

Common Characteristics

- Herbaceous perennials from thick, blackish, scaly woody rhizomes and stout crowns.
- Blades mostly basal, stalked, pinnate, often with small interspersed leaflets.
- Cauline blades often few, the upper small, mostly 3-lobed.
- Calyx 5-lobed, small bracts (bracteoles) alternate them, 5.
- Petals 5.
- Styles not basally jointed (sometimes with terminal segment deciduous), persistent, elongating and often bent in middle, feathery or hooked in fruit.
- Fruit a dense cluster of achenes.

Key to Geum

1. Styles not evidently jointed, conspicuously plumose when mature; leaves mostly basal; cauline leaves a single opposite pair. *G. triflorum*

Styles with evident joint above, hooked but not plumose in fruit, cauline leaves well developed, alternate. 2

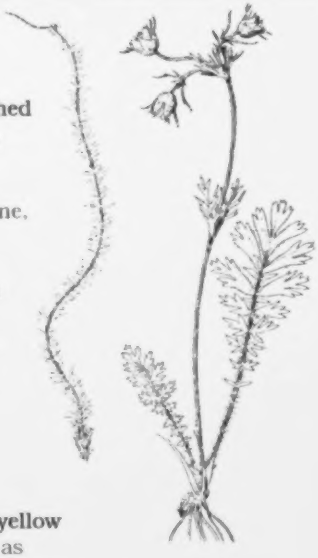
2. Flowers purplish, nodding; sepals 7-10 mm. long, erect. *G. rivale*

Flowers yellow; sepals reflexed, to 8 mm. long. 3

3. Terminal segment of basal leaves deeply incised, wedge-shaped at base, pointed at the tip; styles not glandular. *G. aleppicum*

Terminal segment of basal leaves 3-lobed, with cordate-rounded base, the apex rounded; styles glandular hairy, especially below. *G. macrophyllum*

Geum triflorum Pursh. - Three-flowered Avens



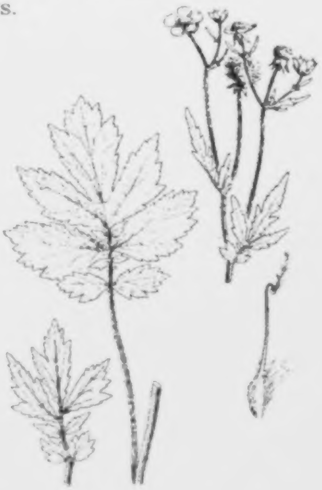
Growth Habit: Plants **from thick scaly blackish rhizomes** and black fibrous roots; **plants spreading and often forming large mats**; crown thick, usually **clothed with old leaves**; stems 1.5-4 dm. tall, often reddish-tinged, hairy.

Blades: **Mostly basal**, oblong-obovate in outline, **pinnate with 9-19 wedge-shaped segments, these again cleft into narrow divisions**; small leaflets often interspersed; blades hairy, often grey-green on both surfaces; cauline blades few, much smaller, pinnately divided into narrow divisions.

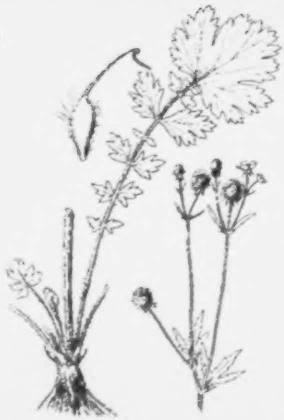
Inflorescence: Flowers 1-7, **often nodding**; bracteoles often reddish, at least some cleft into narrow segments; sepals **erect**, **purplish** or sometimes **yellow and red-veined**; petals about as long as sepals, **yellow to pink**; achenes about 3 mm. long, with **greatly elongated styles 2-4 cm. long**, these **feathery except at tip, not obviously jointed**, abruptly bent, **purplish**.

Similar Species:

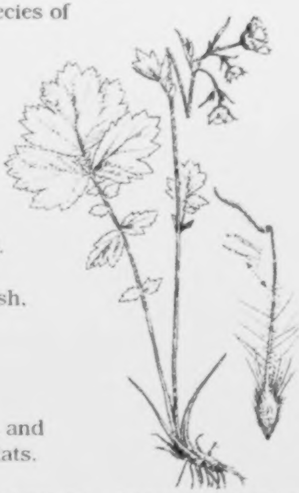
1. *Geum aleppicum* Jacq. - Yellow Avens
   Common in all regions except the prairies. Found in moist woods and clearings, wet thickets.
   Distinguishing features:
   - Stems 4-10 dm. tall.
   - Cauline blades well developed, becoming smaller above.
   - Leaves with 5-9 wedge-shaped, sharply toothed segments and smaller interspersed leaflets.
   - Terminal leaflets similar in size and shape to others.
   - Sepals lanceolate, bent backward.
   - Petals yellow.
   - Achenes hairless on the sides.
   - Styles not feathery, not glandular, jointed near the middle, the upper portion hairy, hooked.



2. ***Geum macrophyllum*** Willd. ssp. ***perincisum*** (Rydb.) Hult. - Yellow Avens; Large-leaved Avens
About as frequently occurring as *G. aleppicum* and found throughout most regions.
Differs as follows:
   - Terminal leaflet (basal) much larger in relation to others, rounded apically, rounded-truncate to cordate at base, 3-lobed.
   - Sepals broader, triangular.
   - Achenes uniformly hairy.
   - Styles glandular, at least on lower half.



3. ***Geum rivale*** L. - Purple or Water Avens
Vegetatively resembling both species of yellow avens, with terminal leaflets somewhat intermediate, showing characteristics of both species. Found in marshes, along streams. An indicator of rich, fertile soils.
Differs as follows:
   - Blades more cuneate-based.
   - Flowers distinctly nodding.
   - Sepals erect, usually purplish, larger (7-10 mm. long).
   - Petals pink to yellow, purple-veined.
   - Styles as in *G. aleppicum*.
   - Somewhat less widespread, and more restricted to wet habitats.



Habitat & Distribution: Common in the foothills and montane regions, frequent in both the parkland and prairies, with a few occurrences northward. Grows in open grassland, restricted to depressional areas and north facing slopes in driest regions.

Forage Value: Poor, the genus as a whole rated as inferior forage and less palatable than most associated range grasses.

Grazing Response: An increaser #1, especially common in foothills fescue grasslands that are moderately grazed, but tends to disappear on heavily utilized and altered range.

Notes: *Geum*, the ancient Latin name for one of the species, originating from *geyo*, meaning "to impart a relish", the shredded roots of a European species once used in making relishes; the specific name from the obvious arrangement of flowers in clusters of 3 (sometimes 1-7); also known as prairie smoke, old man's-whiskers, both names alluding to the feathery fruit; *G. triflorum* was variously used by aboriginal people, the Blackfoot using a decoction from boiled roots for sore eyes, the dried foliage mixed with other medicines and used as a tonic, and as well, a perfume was made from crushed seeds; *Geum* species have ornamental value and can be grown easily from seed; development of the species on a commercial scale, however, would be hampered by the mechanical difficulties incurred in handling the seed.

POTENTILLA L. - Cinquefoil

Common Characteristics

- Annual, biennial or perennial herbs (one species a shrub), often with well developed rhizomes.
- Leaves compound, alternate.
- Flowers (1) few-many in bracteate cymes.
- Bracteoles, sepals and petals each 5.
- Petals white, purplish, or more commonly yellowish.
- Fruit an achene.
- Styles not elongating, feathery or hooked in fruit; jointed near base and deciduous.

Key to Potentilla

1. Flowers red-purple; creeping aquatic or amphibious plants. *P. palustris*

Flowers yellow or white. 2

2. Small creeping species, stems subshrubby; leaves trifoliate and leaflets 3-toothed at apex; flowers white; of sandy boreal sites. *P. tridentata*

Flowers yellow or if white, leaves not trifoliate. 3

3. Leaves pinnate, silvery below; plants with stolons; flowers solitary from nodes of stolons, flower stalks leafless; of low, moist habitats. *P. anserina*

Plants not as above. 4

4. Basal leaves pinnate. 5

Basal leaves palmately 5-9 divided or trifoliate. 11

5. Plants glandular hairy; petals pale yellow-white or white. *P. arguta*

Plants mostly not glandular hairy; petals yellow. 6

6. Lower leaf surface densely white tomentose, often also with silky hairs. 7

Lower leaf surface glabrous or somewhat hairy but not white tomentose. 8

7. Low, caespitose plants with red-brown sheathing bases, 4-10 cm. tall; leaves not always distinctly pinnate, leaflets 1-2 cm. long. *P. concinna*

Taller plants; leaves distinctly pinnate, leaflets longer. *P. hippiana*

8. Leaflets sometimes nearly digitate, distinctly deeply divided to near the midrib; lower surface tomentose to nearly glabrous. *P. bipinnatifida*

Leaflets (basal) definitely pinnate, mostly hairy. 9

9. Small plants to 15 cm. tall; leaflets 8-21, pinnate, each deeply divided into 3-5 fern-like, linear segments; lower surface sericeous, with some kinked-crinkled hairs; petals distinctly longer than sepals. *P. ovina*

Leaves only divided up to 1/2 way to midrib. 10

10. Leaves mostly glabrous, most hairs seen on veins; stem leaves often subdigitate; subalpine/alpine. .... *P. drummondii*

Leaves woolly below, veiny above; leaves pinnate throughout; widely distributed. .... *P. pensylvanica*

11. Basal leaves mostly trifoliate; often weedy species. 12

Basal leaves digitate (5-9 leaflets). 15

12. Plants rather weedy, of lower elevations. 13

Plants of subalpine/alpine sites. 14

13. Leaves with scattered hairs above; petals about equal to sepals; stamens 15-20; achenes ribbed, 0.8-1.3 mm. long. *P. norvegica*

Leaves usually glabrous above; petals half as long as sepals; stamens 5-15; achenes smooth, to 0.8 mm. long. *P. rivalis*

14. Flowers mostly solitary (2-3), petals showy, 6-9 mm. long; plants small, to 1 dm. tall; stems and petioles tomentose; leaves always 3-divided. *P. uniflora*

Flowers several, petals about 5 mm. long; plants 1-3 dm. tall; stems and petioles not tomentose; leaves with 3 or sometimes 5 leaflets. *P. hookeriana*

15. Leaflets divided almost to midrib. 16

Leaflets divided half way to midrib. 17

16. Stipules entire; petals longer than sepals. *P. gracilis*

Stipules toothed, at least basally; petals shorter than sepals. *P. bipinnatifida*

17. Leaves densely tomentose below, white, much paler than upper surface. 18

Leaves not densely tomentose below, only somewhat paler than upper surface. 19

18. Plants densely tufted, mostly less than 10 cm. tall; leaflets 1-2 cm. long; anthers 0.5-0.8 mm. long; of dry sites. *P. concinna*

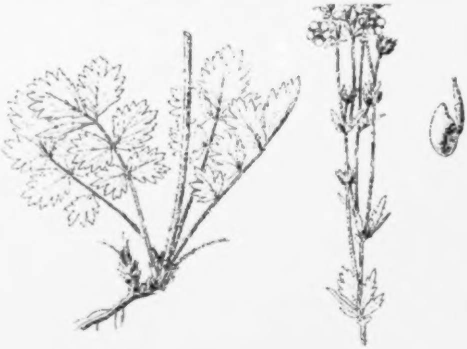
Plants taller, leaflets mostly longer; anthers about 1 mm. long; habitat variable. *P. gracilis*

19. Leaflets elliptic-lanceolate, toothed to the base, always paler below; secondary veins raised; anthers about 1 mm. long; widespread. *P. gracilis*

Leaflets sharply toothed above, the bases entire, wedge-shaped, green above and below; secondary veins not raised; anthers about 0.5 mm. long; foothills/montane species. *P. diversifolia*

Potentilla arguta Pursh - White Cinquefoil

Growth Habit: Perennials from short, thick, stout blackish rhizomes; caudex usually branched; **crown reddish-brown, scaly; stems stout**, ascending-erect, 4-10 dm. tall, purple-tinged and striate, **pubescent with brownish multicellular hairs and also glandular**, at least above.



Blades: Mostly basal, stalked, petioled, **with pubescence like that of stems; blades 7-11 pinnate, leaflets gradually larger toward apex, ovate-oblong, 1.5-4 cm. long, sharply incised, pubescent with brownish hairs and usually glandular**; upper leaves few, much reduced.

Inflorescence: **Cymes with few-numerous flowers, but always tightly congested**, sometimes semiglomerate; **pedicels, sepals and bracteoles densely brownish-pubescent and sticky-glandular**; hypanthium saucer-shaped; sepals erect and elongating (to 12 mm.) in fruit; **petals pale yellow-white; slightly exceeding sepals**; stamens about 25, in groups of 5; styles slender, attached almost basally, glandular near middle; achenes 1-1.3 mm. long, finely striate.

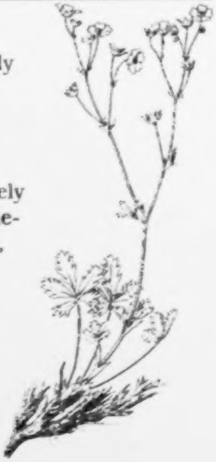
Habitat & Distribution: Common in the south, occasional northward. Found in fescue grassland, depressional areas or those with a high water table in driest regions. Grows on exposed slopes and alluvial flats, especially in western regions.

Forage Value: Poor, flower heads occasionally cropped by wild ungulates but in most cases the plants little used.

Grazing Response: Increasers, the tough root system well adapted to heavy trampling, and plants usually maintaining good vigor and reproductive capacity; the closely related *P. glandulosa* is much more aggressive and where common and best adapted, is an indicator of deteriorated range condition.

Notes: *Arguta*, in Latin, means bright, clear, graceful, rather fitting for this distinctive and attractive potentilla; *P. arguta* has a widespread distribution and grows in a variety of soil and moisture regimes; for these reasons it can be recommended as a candidate for development for the reclamation market.

Potentilla diversifolia Lehm. - Smooth-leaved Cinquefoil



Growth Habit: Perennials from short, thick brown-scaly rootstocks and branching caudex; stems usually several, erect-ascending, often reddish-tinged, somewhat pubescent to nearly glabrous, 1-4 dm. tall.

Blades: Blades mostly basal, on long glabrous to sparsely hairy petioles; **leaves 5(7) digitate, green or blue-green on both surfaces, mostly glabrous above, sparsely hairy below, at least on veins; basal 1/2 of leaflets entire and cuneate, the apical portion sharply lobed less than half way to midrib**; leaflets 1-3 cm. long; **secondary veins not raised**; stipules mostly entire.

Inflorescence: Cymes open, few-several-flowered; calyx pubescent, with triangular-lanceolate lobes; **petals yellow**, exceeding sepals and bracteoles, obovate; **anthers about 0.5 mm. long**; styles slender, eglandular, about the length of achenes, subapically attached; **achenes** to 1.6 mm. long, **finely reticulate**.

Related Species: The above described var. *diversifolia*, with strictly digitate leaves, is easily distinguished from other similar species. However, the two varieties with more or less pinnate leaves closely resemble other pinnate-leaved species, resulting in a taxonomically difficult complex. There are a few characteristics that appear to consistently separate varieties of *P. diversifolia* from other similar species:

- Leaf pubescence, although variable, is never dense enough to be considered "tomentose".
- Leaflets number 5 or at the most 7 per leaf.

The two pinnate-leaved varieties are briefly described below. They occur in much the same locations and habitat as var. *diversifolia* but are less common:

- Var. ***multisecta*** (S. Wats.) Rydb.: Leaves moderately grey-hairy, ultimate divisions deeply cleft, linear, to 1.5 mm. wide.
- Var. ***peridissecta*** (Rydb.) C.L. Hitchc.: Leaves green, glabrous to moderately hairy, deeply cleft into broader-oblong segments.

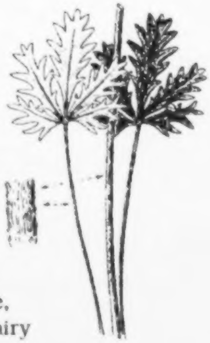
Habitat & Distribution: Common in foothills and montane regions and Cypress Hills. Not present in the north. Found from foothills to alpine elevations where it grows in moist grassland and meadows, on rocky slopes and ledges, and on river flats.

Forage Value: Poor; similar to other potentillas, has palatability ratings below those of many associated species due to the presence of distasteful tannic acid.

Grazing Response: Increasers.

Notes: *Diversifolia* translates "bears leaves of various shapes", which appropriately describes a number of cinquefoils that show an exceptionally wide range of phenotypical variations within a given species, changing both from one geographical location to the next and with habitat differences within a specific ecoregion.

Potentilla gracilis Dougl. *ex* Hook. - Graceful Cinquefoil



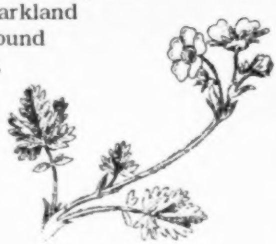
Growth Habit: Perennials from thick, dark-scaly, woody rootstocks; plant base thick, branched, **with persistent dark reddish-brown scales** (old stipules); stems **3-8 dm. tall**, mostly erect, from densely hairy to nearly hairless.

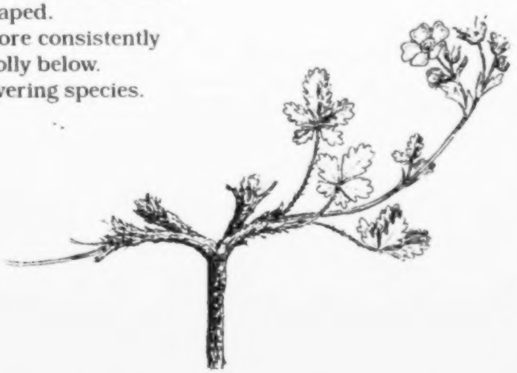
Blades: Basal blades several to numerous, long-stalked, **5-7 digitate, green above, green to grey-hairy below**, leaflets **toothed to near base, 3-8 cm. long, oblanceolate**; secondary veins **usually conspicuously depressed above, raised below** (sometimes difficult to see in hairy varieties); stipules entire, toothed or lacerate; cauline blades 1-3, similar to basal but smaller and short-stalked.

Inflorescence: Cymes erect but open, **often many-flowered**, somewhat flat-topped, with leafy bracts; calyx hairy, with ovate-lanceolate lobes, these longer and broader than bracteoles; petals **yellow, exceeding sepals; anthers about 1 mm. long; achenes greenish, smooth**.

Similar Species:

1. ***Potentilla concinna*** Richards. - Early Cinquefoil
Frequent in foothills, montane and parkland regions, occasional in the prairies. Found in dry, often sandy grassland, on dry, exposed slopes in foothills and montane regions.
Differs as follows:
   - Plants densely tufted.
   - Stems shorter, 4-10 cm. long, often spreading.
   - Leaflets 1-2 cm. long, the lower 1/2 often not toothed, wedge-shaped.
   - Leaves more consistently white-woolly below.
   - Early flowering species.





Habitat & Distribution:

Common in the south, less frequent in northern regions. Found in fescue grassland, on open slopes in foothills and mountains, in prairie grassland and in open woods. Restricted to depressional, often mildly alkaline or saline areas in driest regions.

Forage Value:

Poor, *Potentilla* species in general worthless to cattle, although sometimes grazed by game, the flowers apparently the most palatable; low palatability of nearly all species is attributed to the presence of tannic acid which has an acrid, astringent taste.

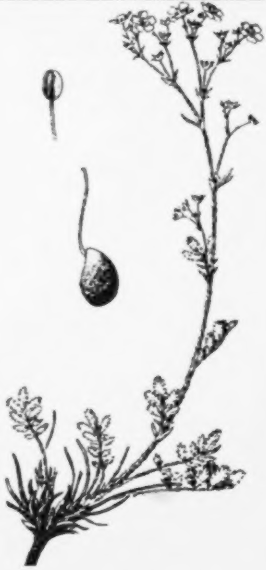
Grazing Response:

Increasers, cinquefoils as a group withstanding heavy trampling, also producing an abundance of viable seed, allowing them a competitive advantage on depleted range.

Notes:

From the Latin *potens*, powerful, a reference to the healing compounds in many species; *gracilis* means graceful and the general term cinquefoil is used as many species have 5-divided leaves; as a group, *Potentilla* is known for its medicinal properties, primarily as an astringent, decoctions made from leaves and roots; as well, roots of some species were a source of tannin, used in tanning, and produced a red dye; *P. gracilis* establishes readily from seed, and shows potential both as an ornamental and as a component of wild flower mixes used in reclamation work.

Potentilla hippiana Lehm. - Woolly Cinquefoil



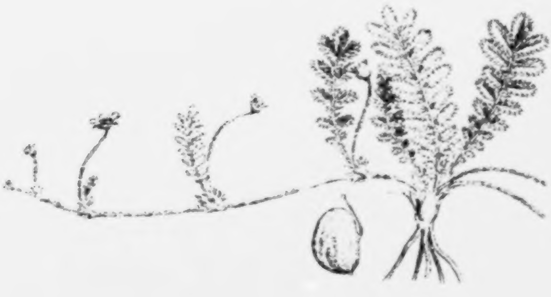
Growth Habit: Perennials from **very thick, woody, dark-scaly rootstocks** and heavy branched crowns, **these clothed with dark brown-black scales**; stems **2-4 dm. tall, grey-hairy**.

Blades: Leaves **distinctly pinnate, with 7-11 oblong-lanceolate leaflets 2-5 cm. long**; leaflets **white-hairy on both surfaces or somewhat green-grey above** and less densely hairy; leaflets **sharply toothed about half way to midrib**; stipules entire, to 3 cm. long, oblong-lanceolate; cauline leaves few, smaller, short-stalked to nearly stalkless.

Inflorescence: Cymes freely branched, distinctly bracteate, the inflorescence (bracts, stalks, calyx, bracteoles) **densely white-hairy**; sepals 4-6 mm. long; **petals yellow**, slightly longer than sepals; styles **slender, not thickened or glandular**; achenes smooth, 1.4-1.6 mm. long.

Similar Species:

1. ***Potentilla anserina*** L. - Silverweed
   Common throughout in moist places: on sandy and gravelly shores, around sloughs and ponds.
   Distinguished as follows:
   - Stems producing long, rooting stolons (unique for the genus).
   - Blades with 7-21 pinnate leaflets and often smaller interspersed ones.
   - Blades grey-hairy to green and nearly hairless.
   - Flowers on leafless stalks.
   - Petals yellow, 6-10 mm. long, showy.



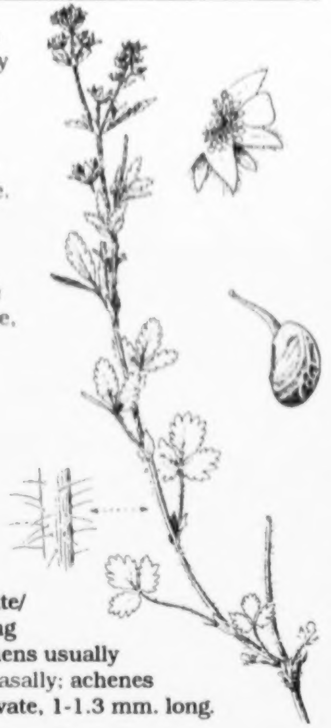
Habitat & Distribution: Common in southern regions. A few occurrences northward. Grows in open places: in fescue grassland, open dry prairie grassland, open dry woods, on exposed slopes. Also in depressional grassland and blow-outs in driest regions.

Forage Value: Poor, (see *P. gracilis*).

Grazing Response: An increaser, well adapted to withstand heavy grazing, and is especially resistant to droughty conditions, this primarily due to development of extensive woody taproots.

Notes: *P. hippiana* can also be recognized, along with most species in the genus, for its medicinal value as an astringent; *P. anserina* appears to have been used more extensively for a wider variety of ailments, including throat and mouth sores, to treat diarrhea, dysentery, and as an antispasmodic; roots were also either boiled or roasted as a source of food; *P. hippiana* is well suited for use as an ornamental in rock gardens and other dry sites, and shows potential as a reclamation species in the prairie region and in dry locations elsewhere.

Potentilla norvegica L. - Rough Cinquefoil



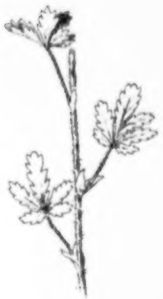
Growth Habit: Taprooted annual or biennial; stems 2-8 dm. tall, spreading but ultimately erect, branched and often flowering for much of their length, reddish-tinged, **rough hairy**, the hairs eglandular but **at least some blister-based**; stems often finely hairy above.

Blades: **Leaves trifoliate**, mostly cauline, petiolate; **leaflets obovate/elliptic-lanceolate, rounded-broadly cuneate at base, 2-6 cm. long**, serrate-crenate, **rough-hairy above and below**; stipules ovate, entire to toothed.

Inflorescence: Cymes long-stalked and elongate, but often rather narrow, conspicuously leafy-bracteate; bracteoles and bracts with rough-hairy pubescence; calyx similarly hairy but also somewhat glandular, its lobes equalling or often shorter than bracteoles; **petals yellow, obovate/retuse, 3/4 as long or nearly equalling sepals but not exceeding them; stamens usually 20 (15)**; styles terminal, thickened basally; **achenes ribbed longitudinally, light brown, ovate, 1-1.3 mm. long.**

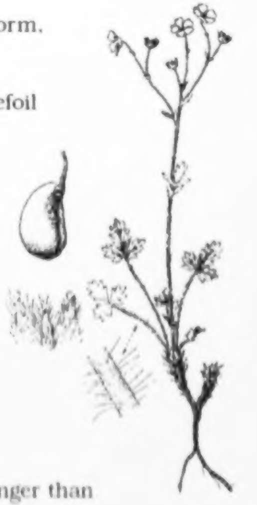
Similar Species:

1. ***Potentilla rivalis*** Nutt. - Cinquefoil
Resembles *P. norvegica* and is found in similar habitats but is generally less common.
Differs as follows:
    - Stem and petiole hairs less coarse, the hairs not as inclined to be blister-based.
    - Leaflets often somewhat smaller, 1-4 cm. long, narrower (oblanceolate/narrowly obovate-oblong) and distinctly narrow-cuneate-based.
    - Leaflets sometimes glabrous above.
    - Petals about 1/2 the length of sepals.
    - Stamens 10 (5-15).
    - Achenes mostly smooth, ovoid-reniform, yellowish, to 0.8 mm. long.

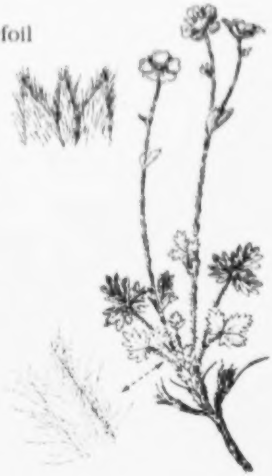


Other Species:

1. ***Potentilla hookeriana*** Lehm. - Cinquefoil
Occasional in subalpine and alpine grasslands, on dry exposed slopes.
Distinguished as follows:
    - Plants 1-3 dm. tall, pubescence of short curly hairs and long, straight hairs on top (but not tomentose).
    - Leaves mostly basal, 3 (5) digitate, 4-15 cm. long.
    - Leaflets divided 1/2 - 2/3 to midrib, white tomentose below, with longer hairs on veins; greenish above with some hairs of mixed lengths.
    - Flowers several; petals somewhat longer than sepals, about 5 mm. long.



2. ***Potentilla uniflora*** Ledeb - Cinquefoil
Common in subalpine/alpine areas, more often found on rocky, scree slopes than in grasslands but very showy and frequently encountered.
Distinguished as follows:
    - Small plants to 1 dm. tall, with stems and petioles tomentose.
    - Leaves strictly 3-divided, 1-2 cm. long, crowded.
    - Leaflets hair-tipped, densely tomentose/sericeous below; greenish and ericeous above.
    - Flowers solitary (2-3), showy, petals 6-9 mm. long.

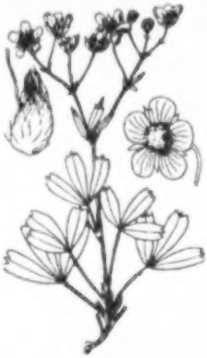


3. ***Potentilla tridentata*** Ait. - Three-toothed Cinquefoil

A boreal species, and an indicator of sandy ecosites throughout southern and northern boreal regions.

Distinguished as follows:

- Creeping plants with subshrubby bases.
- Stems to 3 dm. tall.
- Leaves near base of stems, trifoliate and leaflets again with 3 teeth near apex.
- Leaflets firm, dark green above, oblanceolate, mostly glabrous.
- Flowers in stiff several-flowered cymes.
- Petals white (pink-tinged).
- Achenes hairy.



Habitat & Distribution: Common throughout most regions. Found in moist places: around sloughs and in depressional areas, along irrigation ditches. Also an aggressive weed of waste places. It is likely that both native and introduced elements are present.

Forage Value: Poor.

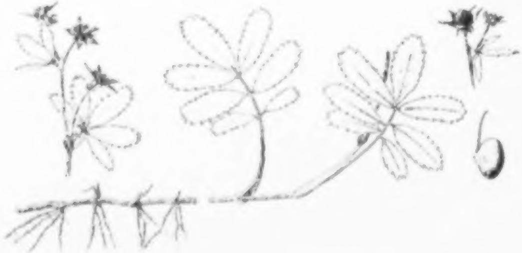
Grazing Response: Increasers (invaders in the case of introduced elements); both *P. norvegica* and *P. rivalis* require exposed soil in order to thrive, and, as such, are not problematic in most well managed rangelands; the three boreal/cordilleran species are not considered particularly aggressive.

Notes: Although annoying in gardens and disturbed places, weedy potentillas can be appreciated for their ability to stabilize these sites to some extent, and in some cases help prevent the invasion of more persistent weeds; the above-mentioned native species are valued in their respective ranges for their contributions to biological diversity, also for their soil stabilization properties.

Potentilla palustris (L.) Scop. - Marsh Cinquefoil

Growth Habit: From elongate **woody reddish-brown rhizomes**; stems up to 1 m. long, **floating, reclining or ascending**, reddish-brown, **often rooting at nodes**, glabrous below, usually pubescent and sometimes **with stalked purple glands above**.

Blades: Leaflets **5-7, pinnate but closely approximate**; leaves both basal (these long-stalked) and cauline (short-stalked to sessile); leaflets obovate-elliptic-oblong, 3-6 cm. long, with sharp-pointed serrations, glabrous and **green above, pale-glaucous and hairy below**; veins depressed above, raised below; blades **often suffused with purple**, particularly around margins.



Inflorescence: Cymes open, few-several-flowered, leafy-bracteate; hypanthium bowl-shaped, the sepals **purplish or green at base**, lanceolate and acuminate, 7-11 mm. long and to 20 mm. long in fruit, glandular and hairy dorsally and around inside margin; bracteoles **green-purple**, much shorter and narrower than sepals; petals **purple**, about as long as bracteoles; stamens 25; carpels numerous; styles mid-laterally attached, slender, smooth, reddish, about as long as achenes; achenes brown-purple, ovate, about 1.5 mm. long.

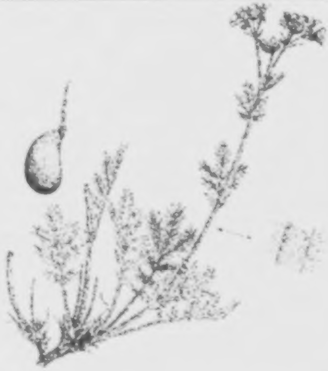
Habitat & Distribution: Common in the boreal forest. A few disjunct populations in the foothills and montane regions. A species of bogs, marshes, shores, sometimes in slow streams, in floating bogs/fens with *Menyanthes trifoliata*. Often an indicator of improved soil nutrient status (as compared to true bogs) that results from water movement.

Forage Value: Poor.

Grazing Response: An increaser, but because of its very restricted habitat, the species is never considered invasive.

Notes: *Palustris* translates, very appropriately, of the swamp or marsh; marsh cinquefoil is a beautiful and very photogenic species, also is valued for its massive, heavy rhizome system that serves to add stability to the spongy sites it inhabits; along with associated bog species, it contributes substantial amounts of organic matter to the soil.

Potentilla pensylvanica L. - Prairie Cinquefoil



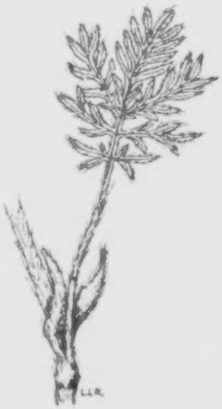
Growth Habit: Perennials from thick, woody rootstocks and a stout, branching caudex; crowns clothed with old, persistent brownish stipules; stems mostly erect, 2-5 dm. tall, **pubescent with short hairs (tomentose) and longer, spreading hairs**.

Blades: Basal blades **5-11 pinnately divided**, the upper leaflets largest, distinctly petiolate; leaflets oblong-oblanceolate, slashed **about 1/2 way to midrib, usually revolute-margined**; leaves sparsely tomentose-sericeous and **green to grey-green above, grey-green below, densely woolly-tomentose to densely sericeous** but **without kinky, crinkly hairs**; cauline leaves usually 1-3, reduced and becoming subsessile, otherwise similar to basal; upper stipules cleft into narrow segments.

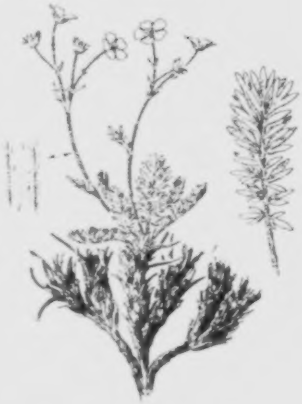
Inflorescence: Cymes several-flowered, narrow, bracteate; inflorescence (bracts, bracteoles, sepals) tomentose and sericeous, and **sepals often glandular**; sepals about 5 mm. long, triangular-lanceolate; bracteoles narrower, often slightly exceeding sepals; **petals yellow, about as long as sepals**; styles **subapical, thickened-glandular at base**, about 1 mm. long; achenes about 1 mm. long, smooth but granular.

Similar/Related Species:

1. ***Potentilla bipinnatifida*** Dougl. *ex* Hook. - Cinquefoil
   Less common, occurring sporadically throughout in dry, open places. Considered by some authors to be a variety of *P. pensylvanica*.
   Differs as follows:
   - Leaflets more closely aggregated, often appearing sub-digitate.
   - Hairs on stems not as distinctly different in length.
   - Leaflets more deeply cleft, usually pectinately divided to near midrib.
   - Pubescence usually similar to that of *P. pensylvanica* but more white that grey below (sometimes nearly glabrous).



2. ***Potentilla ovina*** Macoun - Cinquefoil
Frequent on exposed ridges, rock outcrops, from foothills to alpine areas. Found in the Rocky Mountain region. Differs as follows:
- Plants to 15 cm. tall.
- Leaflets 8-21, pinnate, each divided into 3-5 fern-like linear segments.
- Lower leaf pubescence sericeous and with some kinked hairs.
- Inflorescence with 1-5 flowers.
- Sepals 4-5 mm. long, shorter than petals.
- Petals yellow.



Habitat & Distribution: Common in all but the boreal forest regions. A species of dry locations: found in dry prairie, sandy grassland, on exposed slopes and ridges.

Forage Value: Poor.

Grazing Response: Increasers, usually left ungrazed, also fairly resistant to trampling and droughty conditions; it must be noted that, on dry ridges and sandy sites, high prominence of *P. pensylvanica* and other well adapted species can occur naturally, and is not necessarily an indication of deteriorated range condition.

Notes: The specific name translates "of Pensylvania", the common name very aptly describing its distribution patterns; the subgroup to which prairie cinquefoil belongs is, taxonomically, a difficult and perplexing one, this due to both the close similarities between separate species, and the significant variations that naturally occur within many species; *P. pensylvanica* can be successfully transplanted into dry gardens, also is of some importance as ground cover on exposed and sometimes deteriorated sites. *Note:* The rather similar *P. drummondii* Lehm. is found in subalpine/ alpine meadows; leaves are divided 1/2 way to midrib and are often (cauline) subdigitate, with rather few hairs mostly on veins and margins; flowers 1-2 cm. wide, the yellow petals often emarginate.

LEGUMINOSAE - Pea Family

Common Characteristics

- Annual to perennial herbs (rarely shrubs).
- Roots various (taproots, rhizomes, fibrous) and characteristically nodulose, the nodules capable of fixing free nitrogen.
- Leaves mostly pinnately or palmately compound, stipulate, alternate, sometimes modified as tendrils.
- Inflorescence various, with perfect flowers.
- Calyx lobes 5 (sometimes less).
- Flowers "papilionaceous" (butterfly-shaped).
- Corolla of 5 petals: upper (standard), two lateral (wings) and two lower, these usually united to form the keel, which encloses stamens and pistil.
- Stamens mostly 10 (5), mostly in two groups of 9 and 1.
- Pistil 1, superior.
- Fruit a legume (pod), usually opening along 2 seams, occasionally breaking into 1-seeded segments.

Key to Leguminosae

1. Plants climbing, leaves with tendrils. 2

Plants not climbing, leaves without tendrils. 3

2. Styles very narrow, not flattened, the tip bearded. *Vicia*

Styles flattened, bearded on the upper side. *Lathyrus*

3. Keel petals abruptly cut off at the tip (truncate); fruit elongate, segmented. *Hedysarum*

Keel petals rounded or pointed; fruit not segmented. 4

4. Blades glandular-dotted or roots tuber-like. 5

Blades not glandular-dotted. 7

5. Leaves palmately divided. *Psoralea*

Leaves pinnately divided. 6

6. Flower very small, in dense cylindrical spikes; pods very small, not prickly. *Petalostemon*

Flowers 10-15 mm. long; pods 1-2 cm. long, covered with hooked prickles. *Glycyrrhiza*

7. Leaflets more than 3. 8

Leaflets mostly in 3's. 12

8. Leaflets 5, pinnate, the lowest reduced to stipules; flowers bright yellow, in an umbel-like arrangement; introduced. *Lotus*

Flowers not bright yellow, not in umbels. 9

9. Leaves palmate. *Lupinus*

Leaves pinnate. 10

10. Flowers pink-purple; calyx lobes very narrow; fruit with stout spines; introduced. *Onobrychis*

Plants without above characteristics. 11

11. Stem leaves usually present; keel petals rounded to blunt at the tip. *Astragalus*

Stem leaves usually absent; keel petals sharp-pointed at the tip. *Oxytropis*

12. Leaflets not toothed; plants with showy yellow flowers. *Thermopsis*

Leaflets toothed. 13

13. Flowers in dense spherical heads, petals persistent in fruit. *Trifolium*

Flowers in oblong to linear racemes (if spherical, then flowers yellow), petals not persistent. 14

14. Low, cushion-like plants of dry prairie habitats; leaves not toothed; mostly native. *Astragalus*

Tall plants, widespread; leaflets toothed; introduced. 15

15. Inflorescence slender, 5-10 cm. long; pods short, ovoid-spherical. *Melilotus*

Inflorescence oblong, to 3 cm. long; pods curved to coiled. *Medicago*

ASTRAGALUS L. - Milk Vetch

Common Characteristics

- Perennial herbs with rhizomes or taproots.
- Leaves odd-pinnate, usually with numerous leaflets.
- Flowers mostly in axillary racemes, sometimes in dense spikes.
- Flowers mostly showy, elongate, keel rounded.
- Stamens in typical arrangements of 9 and 1.
- Pods variously shaped.

Key to Astragalus

1. Densely tufted, low plants mostly less than 10 cm. tall; leaves often crowded at the base, flowers often among basal leaves; prairie species. 2

Taller plants with elongate, mostly leafy stems; distribution variable. 3

2. Leaflets in 3's; flowers yellow or purplish-tinged. *A. gilviflorus*

Leaves linear-oblanceolate, simple or with 1-2 leaflets, silvery; flowers blue. *A. spatulatus*

3. Stems stout, 5-10 mm. across at base; leaflets long (2-6 cm.). 4

Stems more slender, leaflets shorter. 8

4.	Flowers purple-blue or mostly so.	5
	Flowers white or yellowish.	6
5.	Stems and pods with black hairs; racemes loose; pods stalked, not grooved; woodland species.	*A. robbinsii*
	Stems and pods without black hairs; racemes in congested spikes; pods with 2 grooves on upper surface; of open habitats.	*A. bisulcatus*
6.	Leaflets very narrow, 2-6 cm. long; flowers to 25 mm. long; prairie species.	*A. pectinatus*
	Leaflets elliptic to oblong; flowers to 15 mm. long.	7
7.	Hairs on foliage simple; inflorescence of 10-40 flowers, loose; pods smooth, reflexed; of wooded western/boreal regions.	*A. americanus*
	Hairs on foliage 2-forked; inflorescence dense, of 30-150 flowers; pods erect; scattered except uncommon in foothills/Rocky Mountains.	*A. canadensis*
8.	Flowers mostly yellow, sometimes purplish-tinged.	9
	Flowers mostly pink-blue or purplish.	17
9.	Flowers large, about 20 mm. long.	10
	Flowers at most 15 mm. long.	11
10.	Plants not woolly, keels lavender-tinged; pods fleshy, rounded, plum-like.	*A. crassicarpus*
	Plants woolly-hairy; keels yellow with blue tips; pods dry.	*A. drummondii*
11.	Wing petals deeply notched; keels about 1 mm. shorter than wings; pods asymmetrical; foliage and pods variously hairy to subglabrous.	*A. aboriginum*
	Wing petals entire at apex.	12
12.	Keels about 6 mm. long, much shorter than wings; pods symmetrical; foliage and pods tending to be glabrous.	*A. tenellus*
	Keels about as long as wings, more than 6 mm.	13
13.	Leaves with simple hairs above and below; flowers in dense racemes; pods globose, with black and white hairs; introduced.	*A. cicer*
	Plants without above combination of characteristics; native.	14
14.	Flowers to 18 mm. long, in dense heads.	15
	Flowers to 10 mm. long, racemes loose.	16
15.	Foliage with simple (basifixed) hairs.	*A. dasyglottis*
	Foliage with hairs 2-forked (malpighian).	*A. striatus*
16.	Pods with only white or no hairs.	*A. miser*
	Pods with some black hairs.	*A. alpinus*

17. Flowers 5-12 mm. long. 22

Flowers more than 12 mm. long. 18

18. Plants with 2-forked (malpighian) hairs. 19

Plants without malpighian hairs. 20

19. Leaflets silvery, ovate; flowers large, to 20 mm. long, rather few (3-9) in loose racemes. *A. missouriensis*

Leaflets green, more elongate, flowers more numerous, to 18 mm. long, in dense heads. *A. striatus*

20. Flowers in dense racemes to 15 cm. long, reflexed; pods with 2 grooves on upper side. *A. bisulcatus*

Flowers and pods not as above. 21

21. Flowers erect in dense rounded racemes; pods erect, ovoid-oblong. *A. dasyglottis*

Flowers in loose racemes; pods round, fleshy, plum-like. *A. crassicarpus*

22. Calyx teeth linear, as long as the tube; small species of foothills to alpine elevations. *A. vexilliflexus*

Calyx teeth triangular-lanceolate, shorter than the tube; size and distribution variable. 23

23. Stems with black hairs. 24

Stems without black hairs. 25

24. Small creeping, reclining plants, stems to 3 dm. long; leaflets rounded-notched, to 1 cm. long. *A. alpinus*

Large plants, erect, 2.5-6 dm. tall, with some stems to nearly 5 mm. thick; leaflets mostly 1-2 cm. long. *A. robbinsii*

25. Pods with only white hairs or glabrous; plants of moist northern/western regions. 26

Pods with some black hairs; plants of dry prairie/ montane habitats. 27

26. Small, mat-forming species with spreading stems 1-3 dm. long; keels at least 6 mm. long; pods short-stalked. *A. alpinus*

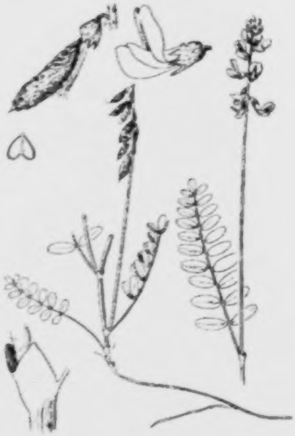
Taller, more erect plants 3-6 dm. tall; keels short, to 6 mm. long; pods sessile. *A. eucosmus*

27. Leaves elliptic-linear or oblong, pointed, flexuose; keel tips pointed. *A. miser*

Leaves oblong-oblanceolate, truncate or obtuse; keels blunt. *A. flexuosus*

Astragalus alpinus L. - Alpine Milk Vetch

Growth Habit: Perennials with long, slender creeping rhizomes, **mat forming; stems slender spreading-reclining to ascending**, 5-25 (30) cm. long, glabrous or with black hairs.

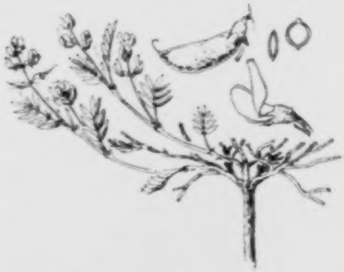


Blades: Leaflets 13-33, **ovate-oblong-elliptic, usually retuse at apex, 5-15 mm. long**, pubescent on both surfaces or glabrous above.

Inflorescence: Racemes short, 1-4 cm. long, **10-30-flowered**, lax and somewhat elongating in fruit, the peduncles equalling or surpassing leaves; **calyx black-hairy**, 3-4.5 mm. long, about 1/3 the length of flowers; calyx teeth shorter than tube; **flowers 7-12 mm. long, purplish, the wings paler (sometimes white) and shorter than standard and keel, these about equal in length; pods reflexed, on stipes about as long as the calyx, ellipsoid-oblong, 8-12 mm. long, black hairy**; lower suture intruding to form an almost complete partition.

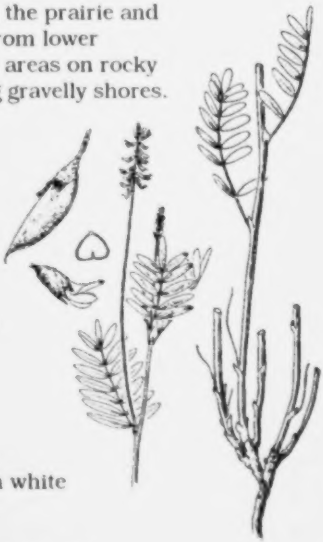
Similar Species:

1. ***Astragalus vexilliflexus*** Sheldon - Few-flowered Milk Vetch
   Common in the foothills/ southern Rocky Mountain region, also in Cypress Hills. Found on gravel bars, in open dry places, on disturbances.
   Differs as follows:
   - Also a slender, mat-forming but tap-rooted plant, leaflets fewer (7-11), acute.
   - Flowers fewer (3-6), to 8 mm. long, purplish.
   - Calyx teeth linear, as long as tube; pods sessile.

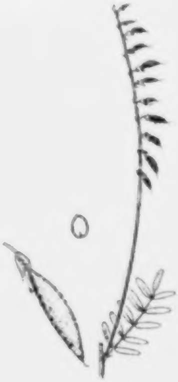


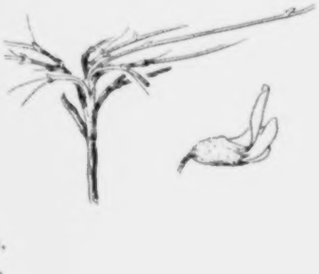
Other Species:

1. ***Astragalus eucosmus*** Robins. - Milk Vetch
   Rather widespread, absent from the prairie and drier parkland regions. Found from lower elevations to montane/subalpine areas on rocky slopes, in moist meadows, along gravelly shores.
   Distinguished as follows:
   - Stems 3-6 dm. tall, sometimes glabrous, arising singly or a few together, erect.
   - Leaflets 1-2.5 cm. long, elliptic-oblanceolate, 9-19.
   - Leaflets mostly glabrous above, sparsely hairy below.
   - Racemes elongating/loose at maturity.
   - Flowers 6-8 mm. long.
   - Flowers white-purplish.
   - Pods sessile, reflexed, oval-rounded, to 1 cm. long, with white and black hairs.



2. ***Astragalus robbinsii*** (Oakes) A. Gray var. ***occidentalis*** S. Wats. - Milk Vetch
   Most common in the Rocky Mountain region, with some occurrences in southern boreal regions. Found in moist woods, along streams.
   Distinguished from *A. eucosmus* as follows:
   - Robust plants 2-6 dm. tall, with stems up to 5 mm. thick, stems with black hairs.
   - Leaflets elliptic-ovate, obtuse, 9-19 per leaf.
   - Leaflets somewhat hairy below, glabrous above.
   - Flowers pale to pink-purple, 6-11 per raceme, 8-10 mm. long.
   - Pods stalked, drooping, 15-18 mm. long, with black hairs.





Habitat & Distribution:

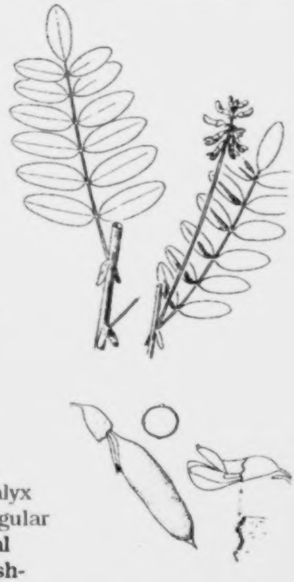
Common in the foothills and Rocky Mountain regions, with less frequent occurrences in the boreal forest. Found in open woods, on grassy meadows and hillsides, on rocky slopes and ledges, on moist banks and rocky river flats.

Forage Value: Fair, non-toxic and also palatable, but producing rather small amounts of vegetation.

Grazing Response: Increasers.

Notes: An attractive species, also circumpolar in its distribution, and as such, with a relatively wide range of adaptations; alpine milk vetch is promising for development for both northern and alpine regions as an early successional legume; *A. vexilliflexus* is equally adapted within its range to open places, *A. eucosmus* and *A. robbinsii* requiring increased moisture and suited to wooded regions. *Note:* Found on gravel bars in the Rocky Mountain region is *A. bourgovii* A. Grey; plants are taprooted, leaflets pointed, and pod stipe shorter than calyx tube; otherwise similar to *A. alpinus*.

Astragalus americanus (Hook.) M.E. Jones - American Milk Vetch



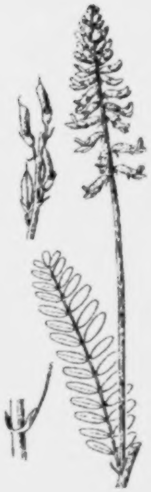
Growth Habit: Perennials **from rhizomes** and stout, woody caudices; stems solitary to several, often **5 mm. wide or more at base**, erect, **3-10 dm. tall**, mostly hollow, ridged, green, **hairless to sparsely white-long soft-hairy**, little branched above.

Blades: Blades mostly on upper 2/3 of stem, lower stem marked by **conspicuous brownish-membranous to leaf-like reflexed stipules**; leaves large, leaflets 7-17, **ovate oblong to oblanceolate, 2-4 cm. long, hairless above, sparsely white-hairy and paler below; hairs not attached by middle**.

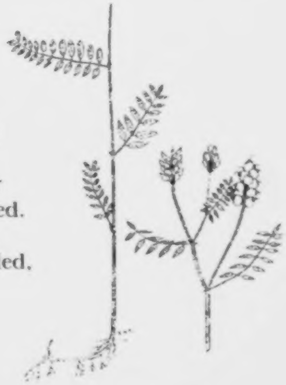
Inflorescence: Racemes **loosely 15-40 flowered**, often several, usually surpassed by leaves; calyx oblique, 4-5 mm. long, with short triangular teeth, hairless **except for white marginal hairs**; flowers **10-15 mm. long, yellowish-white**, usually reflexed; pods **drooping/reflexed**, on stalks 6-10 mm. long, narrowly oval, **inflated, membranous, mostly hairless and shiny, 1.5-2 (3) cm. long**.

Similar Species:

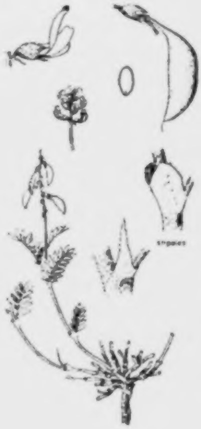
1. ***Astragalus canadensis*** L. - Canada Milk Vetch
   Frequent in all regions except the boreal forest. Found in open woods, moist grassland, on banks and shores. Often associated with fescue grasslands.
   Differs as follows:
   - Stems and lower leaf surface with 2-forked hairs.
   - Flowers more numerous, 30-150 per spike.
   - Flowers deeper yellow.
   - Pods woody, erect, not membranous and shiny.
   - Pods darkening with age, often persisting through winter.



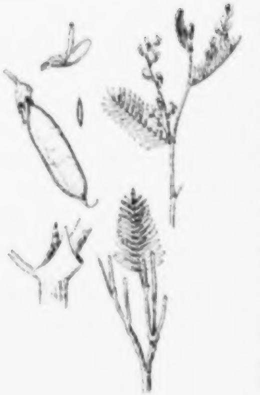
2. ***Astragalus cicer*** L. - Cicer Milk Vetch
   An introduced species, used in reclamation and as forage.
   Differs from *A. canadensis*:
   - Stems often not as stout.
   - Pubescence not attached by middle.
   - Blades pubescent above as well as below.
   - Racemes also dense but shorter (4-6 cm. long) and fewer-flowered.
   - Calyx black-hairy.
   - Pods globose, inflated, thin-walled, black-pubescent.



3. ***Astragalus aboriginum*** Richards. - Indian Milk Vetch
   Common in the foothills and montane regions, present but uncommon elsewhere. Grows in dry, often sandy grassland, on exposed slopes and gravelly river banks, sometimes at alpine elevations.
   Distinguished as follows:
   - Rhizomes absent.
   - Stems more slender, often reclining, 1-4 dm. tall.
   - Leaflets narrowly oval-lanceolate, to 20 mm. long, often hairless above.
   - Flowers 8-13 mm. long, pale yellowish with purple-tipped keels; keels 1 mm. shorter than wings.
   - Wing petals deeply 2-cleft.
   - Pods drooping, not symmetrical, to 3 cm. long, mostly hairless.



4. ***Astragalus tenellus*** Pursh - Loose-flowered Milk Vetch
Found in much the same areas as *A. aboriginum* and in similar habitats.
Differs from it as follows:
- Leaflets narrower, linear to narrowly oblong.
- Leaflets glabrous.
- Flower color often more yellow (keels purple-tipped); keels to 6 mm. long, much shorter than wings.
- Wing petals not 2-cleft.
- Pods also drooping, but shorter (7-15 mm. long), linear-elliptic and not asymmetrical, always glabrous.



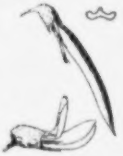
Habitat & Distribution: Grows primarily in the foothills, montane and boreal forest regions. Found in moist or shaded areas: on wooded stream banks, in coniferous forests, open woods, moist meadows, on lush colluvial slopes.

Forage Value: Good; although little specific information is available, it can be assumed that the worth of both American and Canada milk vetch is underrated: field observations indicate the lush foliage is readily grazed throughout the season, and nutritional analysis, although not specifically determined, appears similar to that of other good quality legumes; both species are highly productive, and show potential for development as forage species; cicer milk vetch is palatable in early growth stages, also makes fair quality hay.

Grazing Response: Decreasers, (*A. americanus/canadensis*) and the decline of the species an indicator of overgrazing.

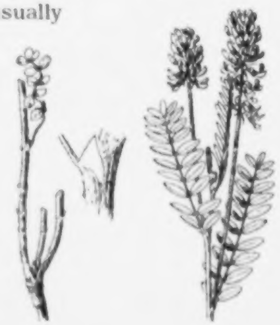
Notes: Syn. *A. frigidus* var. *americanus*; *Astragalus* possibly from the Greek *astragalos*, meaning ankle-bone, a reference to pod or leaf shape; both the specific and common name suggest the species' N. American distribution; there is some possibility that our species may have similar medicinal value to the closely related Chinese Huang Qi; American milk vetch has been recognized as a potential reclamation species, useful in the moister regions, also tolerant of at least moderate soil acidity; as with most legumes, seed requires scarification, and preliminary trials show rather poor germination, possibly due to germ dormancy; seedlings are relatively slow to establish, thus when growing with aggressive competitors (both weeds and seeded species) will show poor survival. *Note: A. canadensis* is recommended for grasslands in the foothills and parkland regions, and appears to have better seedling survival rate and vigor, but is also susceptible to elimination by heavy grazing; it can readily be observed that when major disturbances in native grassland are seeded to high quality legumes, ungulate grazing patterns shift, with the seeded sites often being continuously grazed; although detrimental to the reclamation efforts, this is effective in resting the surrounding rangelands; in some cases fencing is required in order to create rotational grazing patterns, or, alternately, the implementation of other livestock manipulative tools such as salting and water development.

Astragalus bisulcatus (Hook.) A. Gray - Two-grooved Milk Vetch



Growth Habit: **Densely tufted** from a stout taproot and woody branched caudex; stems several, **stout, tough**, ascending-erect, sparsely white-coarse-hairy, **4-10 dm. tall**.

Blades: Leaves borne to near base, with **17-27 lanceolate-oval/oblong leaflets**, these 1-3 cm. long, usually **white-coarse-hairy below, more sparsely so to hairless above**; hairs not attached by middle.



Inflorescence: Flower stalks rather thick, overtopping leaves; **racemes spike-like, dense, 4-15 cm. long**; calyx 6-9 mm. long, with linear-lanceolate teeth, **black-hairy**; flowers **reddish-purple** (rarely white in f. *albiflorus* Boivin), **sharply reflexed, 11-15 mm. long**; pods **reflexed**, on stalks about as long as calyx tube, linear-oblong, membranous, hairless, **to 2 cm. long, with 2 deep grooves on upper side**.

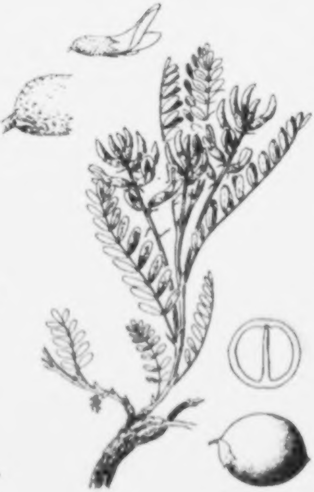
Habitat & Distribution: Frequent in the prairie and parkland regions, occasional in the southern foothills. Found in prairie grassland, on dry, often eroded banks, on clay (often alkaline) alluvial soils, on coulee slopes. Tolerant of droughty, infertile soils.

Forage Value: Poor, unpalatable and only consumed when better forage is depleted, also poisonous to livestock under conditions that allow plants to absorb toxic quantities of selenium from the soil; risk of poisoning is higher in the spring when milk vetch greens-up before many associated species, on overgrazed pastures and when selenium levels are high (highest levels occurring in dry conditions, and on alkaline rather than acidic soils); as the poisonous principle is present throughout the entire plant, and does not dissipate in drying, hay containing *A. bisulcatus* is also poisonous; death is caused by respiratory failure in cases of acute poisoning, and usually by starvation in the more chronic "alkali disease" caused by feeding forage grown on selenium soils.

Grazing Response: An increaser, the deep-seated taproot resistant to trampling and drought.

Notes: As the name implies, the species is most easily identified later in the season by its 2-grooved pods; *A. bisulcatus* has some ornamental value, although the unpleasant plant odor can be a deterrent for developing seed and also using the species in confined spaces; *A. bisulcatus* is useful to some extent in stabilizing disturbed alkali slopes and flats, and is known to be especially attractive to nectar-seeking insects.

Astragalus crassicarpus Nutt. - Ground Plum; Buffalo Bean



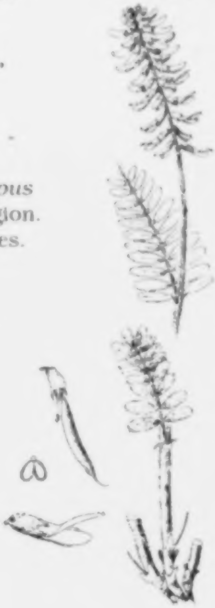
Growth Habit: Perennial from a **stout taproot** and thick, woody, branched caudex, **somewhat mat forming as plants spread from base; stems reclining to somewhat ascending**, 1-5 dm. tall, sparsely to moderately white-hairy.

Blades: Leaflets 13-25, **oval to oblong**, the **top rounded and often notched; 5-20 mm. long, hairless and green above, white-hairy** and barely if at all paler **beneath**, often slightly fleshy.

Inflorescence: Racemes **loosely 5-20 flowered**, usually surpassed by leaves; calyx with 2 small bracts, **black-hairy**, to 2/3 as long as corolla, the lobes lanceolate; flowers **white with purple-tinged to purple keels**; flowers **about 2 cm. long, showy**; pods **stalkless, spherical**, to 2 (2.5) cm. across, **fleshy and red, becoming brownish, dry, not opening**.

Similar Species:

1. ***Astragalus drummondii*** Dougl. *ex* Hook. - Drummond's Milk Vetch
   Distribution similar to that of *A. crassicarpus* but absent from the northern parkland region. Grows in open grassland, on exposed slopes.
   Distinguishing features:
   - Plants erect, 4-8 dm. tall.
   - Stems and lower leaf surface densely white-woolly.
   - Flowers large (to 2 cm. long), pale yellow and the keel only purplish at the tip.
   - Pods cylindrical, drooping, hairless.



Habitat & Distribution: Frequent in the south, found in foothills and montane areas and eastward throughout most of the region. Grows in fescue (*F. campestris* and *F. hallii*) grassland where it is found in open plains, on slopes. Absent from infertile and poor soils.

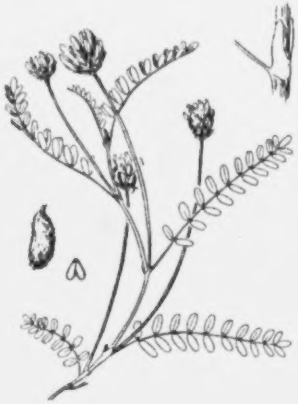
Forage Value: Good, general nutritional information indicating a high protein and low crude fiber content, and both foliage and pods are highly palatable; recent findings indicate similar forage value ratings for *A. drummondii*.

Grazing Response: A decreaser, the species declining and in some areas disappearing because of overgrazing and loss of habitat due to cultivation.

Notes: Both the common and specific names allude to the thick, fleshy pods; ground plum was used by native people who were reported to gather the green fruit, this eaten either boiled or raw; *A. crassicarpus* makes an attractive ornamental, the large flowers and pods making a showy display from early spring until fall; a valuable range species, and now rare in some localities. *A. crassicarpus* is recommended in re-seeding projects in the prairie region and in dry sites in the foothills; however, although plants grow readily from seed, propagation can be difficult: the fleshy pods rot easily with late season moisture and with improper storage, and seeds require scarification; *A. drummondii* is useful in seed mixes in drier sites in the foothills and parkland regions as well as throughout most of the prairies.

Astragalus dasyglottis Fisch. *ex* DC. - Purple Milk Vetch; Field Milk Vetch

Growth Habit: Perennials from **extensive slender rhizomes, usually mat forming**; plant base subterranean; stems numerous, **reclining to ascending, 1-3 dm. long**, hairless to hairy **with black and white hairs**.

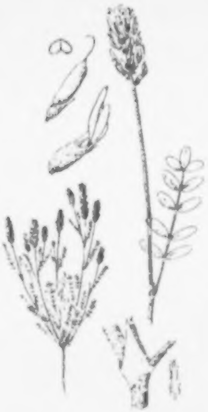


Blades: Leaves with 11-19 **linear to oblong-lanceolate, notched leaflets 1-2 cm. long**; green and white-hairy on both surfaces or nearly hairless above; **leaf hairs simple**.

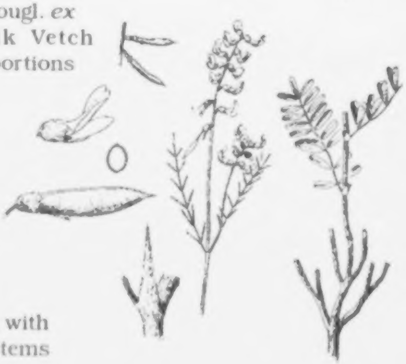
Inflorescence: Racemes **in dense spherical heads 1-4 cm. long**, long-stalked from leaf axils, the flowers erect-ascending; calyx about half as long as corolla, black-hairy, with linear teeth; corolla **about 18 mm. long, purplish or white-tinged**, especially on wings; pods stalkless, **erect, ovoid-oblong, 1 cm. long**, black-coarse-hairy.

Similar Species:

1. ***Astragalus striatus*** Nutt. - Ascending Purple Milk Vetch
   Distribution similar to that of *A. dasyglottis*. Found in open grassland, on hillsides, on gravelly and often disturbed sites, on rocky slopes.
   Differs as follows:
   - Tufted plants from taproots.
   - Stems stouter, to 4 dm. tall.
   - Hairs (except on pods) 2-forked.
   - Blades similar in shape and hairiness but to 2.5 cm. long, the tip not notched.
   - Racemes dense, more oblong.



2. ***Astragalus flexuosus*** Dougl. *ex* Don. - Slender Milk Vetch
   Restricted to southern portions of the foothills and parkland regions. Found in open, dry grassland, on open, often sandy or rocky slopes, in disturbed places. Associated with fescue grasslands.
   Distinguishing features:
   - Plants rhizomatous, with spreading, slender stems 3-8 dm. long.
   - Stems with dense, short white hairs.
   - Leaflets narrowly oblong and notched, to 2 cm. long, hairy below, hairless above.
   - Racemes elongating to 10 cm. long, loose.
   - Flowers pink-purplish, 6-8 mm. long, the keel short and bluntly rounded.
   - Pods with white hairs, oblong, spreading, 10-20 mm. long.



Habitat & Distribution:

Common in most ecoregions, with occasional occurrences in the boreal forest. Found in fescue grassland, moist or depressional grassland in driest regions, in sandy soil, on montane and alpine slopes and meadows.

Forage Value:

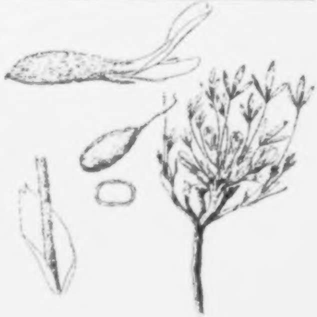
Fair, specific data not available, but, along with the similar *A. striatus*, the species is considered moderately palatable and nutritious.

Grazing Response:

Increasers #1 (all species) and the root systems resistant to moderately heavy trampling, but not surviving in abused or altered range.

Notes: Syn. *A. agrestis*, this translating "wild"; most *Astragalus* species are an attractive addition to wild gardens, and are also valued in reclamation mixes, both to maintain a diverse species composition, and because of their ability to fix nitrogen; *A. flexuosus* may be particularly promising as an early successional species, as it is more capable of persisting under heavy use and in dry, moderately alkaline conditions.

Astragalus gilviflorus Sheldon - Cushion Milk Vetch



Growth Habit: **Low, cushion-like perennials** from multiple woody caudices; **stems 1-4 cm. long, densely cushioned with old stipules and petioles**.

Blades: Stipules membranous, acute, 6-15 mm. long; **blades trifoliate, the leaflets elliptic-oblanceolate, about 1 cm. long; leaves densely silvery-silky** with 2-forked hairs.

Inflorescence: **Racemes mostly 1-2 flowered, subsessile in leaf axils; calyx silvery-silky**, the teeth linear; **corolla yellowish, sometimes purple-tipped, 2-3 cm. long; pods ovoid, sessile, leathery, 7-10 mm. long**, barely as long as calyx, sericeous, indehiscent, few-seeded.

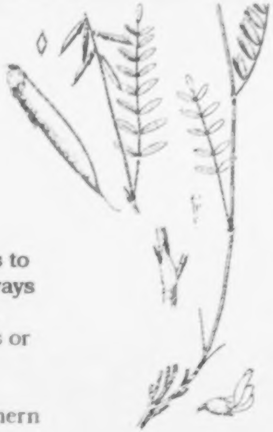
Habitat & Distribution: Frequent in the dry prairie region. Grows on dry, exposed sites, on open rocky ledges.

Forage Value: Poor, insignificant in terms of forage production.

Grazing Response: Increasers on dry exposed sites, but typical of most species of these habitats, would compete less successfully in heavily vegetated areas.

Notes: Syn. *A. triphyllus*, a reference to the characteristic arrangement of leaflets in 3's; an attractive species, suitable for use in rock gardens, and because of its adaptation to droughty, exposed sites, is of at least some importance as vegetation cover in dry prairie habitats.

Astragalus miser Dougl. *ex* Hook. var. ***serotinus*** (Gray) Barneby - Timber Milk Vetch



Growth Habit: **Tufted plants**, often with extensive rootstocks; **stems slender**, several, **reclining to erect, 1-4 dm. tall**; plants grey-hairy to greenish.

Blades: Blades with 9-21 leaflets, these **linear to narrowly lanceolate, pointed, glabrous above, hairy below**.

Inflorescence: **Racemes loose and lax**, with 5-12 **flowers to 14 mm. long, yellow-white but nearly always pink-purple-tinged; pods 2-2.5 cm. long, sessile, linear-oblong, drooping**, glabrous or with **white hairs**.

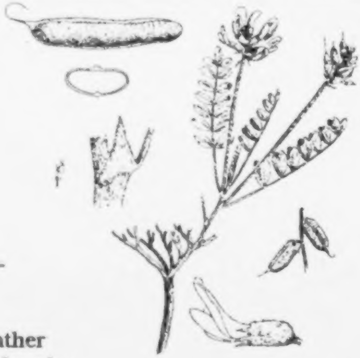
Habitat & Distribution: A species of montane regions in the southern Rocky Mountains. Found in meadows, in open woods, in grassland and on open slopes. Often in dry open woods in montane areas, an indicator of more or less subxeric sites.

Forage Value: Poor, poisonous, and in spite of its toxic properties, is actually high in nutrients, also moderately palatable to sheep and game; poisoning results from ingestion of relatively small quantities of foliage, symptoms occurring in about two days, and include loss of appetite, wheezing, weakness, and often the knocking together of hind feet; in severe cases, paralysis is followed by death; the toxic principle is different from both "loco" and selenium poisoning, possibly caused by another element present in the plant (tin a suspect); timber milk vetch is most likely to be problematic when animals are confined on heavily infested and poor condition rangelands where better quality species have been depleted.

Grazing Response: An increaser, and in dry montane grasslands where it is best adapted, an indicator of overgrazing.

Notes: Syn. *A. decumbens*, this in reference to the decumbent (reclining) growth habit; *miser*, in Latin, means poor or pitiful, perhaps alluding to its poisonous properties (also with similar effects on humans); timber milk vetch is a delicate and attractive species, suitable for use in dry gardens, but will tend to take over unless contained.

Astragalus missouriensis Nutt. - Missouri Milk Vetch



Growth Habit: Perennials from deep, thick, woody taproots and a much-branched woody caudex; **stems tufted, spreading, very short, 2-10 cm. high, silvery-pubescent with appressed 2-forked hairs**.

Blades: Leaflets 7-21, **ovate-elliptic to obovate, 7-12 mm. long, silvery-pubescent with 2-forked hairs**.

Inflorescence: **Racemes short, 3-9 flowered, rather loose** but not elongating, the peduncles elongate, often exceeding leaves; calyx oblique, about half as long as corolla, often with black hairs, with short linear teeth; **flowers showy, blue to rose-purple, 15-20 mm. long; pods sessile, leathery, inflated, oblong-ovoid, 1.5-2 cm. long, often reddish,** finely white hairy, transversely rugulose.

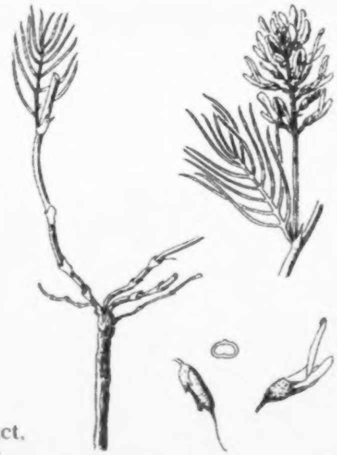
Habitat & Distribution: Frequent in the south, in all ecoregions except the boreal forest. Found on open, dry slopes in foothills and montane areas and eastward, in open prairie grassland, gravelly areas, on eroded banks.

Forage Value: Fair, thought to be at least moderately palatable.

Grazing Response: An increaser #1, never very abundant in moderately to heavily grazed areas; this apparent correlation indicates, in the first place, at least moderate forage value and secondly, a tendency of the species to decline in response to deteriorating range condition.

Notes: Perhaps one of our most attractive milk vetches (superficially, until pod formation, more resembling a *Hedysarum* species), the foliage, flowers and pods equally interesting and appealing as the season advances.

Astragalus pectinatus Dougl. *ex* Hook. - Narrow-leaved Milk Vetch



Growth Habit: Perennial **from a deep, thick taproot**; plant base branched, the **stem bases buried**; stems **thick**, several, their **basal aerial portion leafless but with conspicuous stipules** up to 8-10 mm. long; stems ridged, 2-6 dm. tall, erect to spreading, their bases and basal stipules **reddish-brown flecked**.

Blades: Leaves nearly stalkless, **with 9-17 narrowly linear leaflets 2-6 cm. long**, not jointed with axis (continuous); leaflets white-hairy below, hairless above.

Inflorescence: Racemes loose to somewhat compact, 10-30 flowered; calyx 6-9 mm. long, black-hairy, with short linear teeth; flowers **pale, yellow**, **18-25 mm. long**, pods **8-15 mm. long**, oblong-ovoid, stalkless, **drooping, fleshy at first, becoming woody**, **hairless**, sharply beaked.

Habitat & Distribution: Common in the prairies, occasional in parkland and southern foothills regions. Absent from montane and alpine areas. Found in open, dry places: open prairie grassland, on eroded slopes and clay banks, on alkaline flats. Grows on infertile and poor soils.

Forage Value: Poor, similar to that of *A. bisulcatus*, but the root system often more extensive, and as such is capable of absorbing higher concentrations of selenium; as well, cases of poisoning are more frequent late in the season, possibly because in the drier habitats occupied, the associated vegetation is more often desiccated; livestock appear to be especially attracted to the large, conspicuous pods.

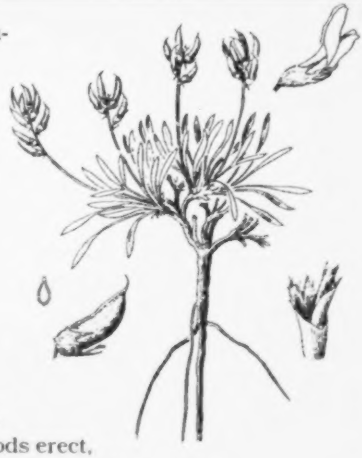
Grazing Response: An increaser, especially well suited to withstand droughty conditions.

Notes: *Pectinatus*, a reference to the narrow, closely-set leaf divisions; narrow-leaved milk vetch is of some value as an ornamental, the foliage, flowers and pods all attractive; it also functions in stabilizing very dry, erodable slopes, particularly well adapted to alkaline and infertile soils where better quality species might have difficulty surviving.

Astragalus spatulatus Sheldon - Tufted Milk Vetch

Growth Habit: **Acaulescent, caespitose, cushion-like perennials** from a thick root and branched crown, less than 10 cm. tall.

Blades: **Leaves grey-green, pubescent with 2-forked hairs; leaves mostly simple, sometimes 3-foliate, tufted, 1-4 cm. long, linear-oblanceolate.**



Inflorescence: Racemes loosely 3-7 (10)-flowered, on peduncles that usually exceed leaves; calyx about 4 mm. long, silky-pubescent, the teeth linear; **flowers purple, 7-9 mm. long**; pods erect, sessile, compressed, oblong, 6-12 mm. long, pubescent, 1-celled, both sutures prominent.

Habitat & Distribution: Frequent in the dry prairie region. Often somewhat locally abundant. Found in dry prairie grassland and especially on exposed hillsides and eroded slopes.

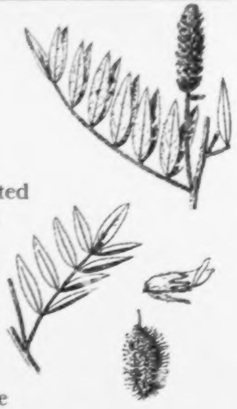
Forage Value: Poor, as with other small cushion-like milk vetches, produces insignificant quantities of forage, and is only marginally palatable for most of the growing season.

Grazing Response: Increasers in dry, exposed places, capable of withstanding considerable trampling due to its thick, heavy root system.

Notes: Syn. *A. caespitosus*, which appropriately describes the depressed growth habit; tufted milk vetch makes an excellent rock garden species, the silvery foliage an effective contrast with associated species having a more extended flowering period; in spite of its small size, *A. spatulatus* does have some soil binding properties, important especially on open erodable slopes where it most often occurs.

GLYCYRRHIZA L. - Licorice

Glycyrrhiza lepidota (Nutt.) Pursh - Wild Licorice



Growth Habit: Perennials from deep, **woody extensive rhizomes**, the **roots licorice-flavored and aromatic**; stems 3-12 dm. tall, erect, **with stalkless and stalked glands** and usually somewhat hairy.

Blades: Leaves **pinnate**, with 7-19 leaflets, these pointed at both ends, **lanceolate**, 2-4 cm. long, entire, short-pointed, **glandular-dotted below**, hairless except minutely hairy on midrib below and on margins.

Inflorescence: Racemes dense, erect, 3-4 cm. long, with numerous **yellowish-white** flowers 10-15 m. long; calyx **glandular**, with 5 narrow teeth, the upper two partially fused; keel long-pointed; stamens 10; pods **oblong**, 1-2 cm. long, reddish-brown, **covered with hooked bristles**, not opening, with a few large seeds.

Habitat & Distribution: Frequent in all regions except the boreal forest where uncommon. Found in moist places: on lake shores and on river banks, in depressional areas, in shrubby coulees, along irrigation canals, in discharge areas. Also in waste and disturbed places.

Forage Value: Poor; although little is known about actual nutrient content, the species is generally considered worthless as a range plant; it is usually avoided by livestock, especially after pod formation.

Grazing Response: An increaser, seldom grazed, and hence maintaining vigorous growth, also spreading readily by rhizomes; the bristly pods are well adapted for dispersal, frequently transported on animal hair and clothing.

Notes: *Glycyrrhiza*, from the Greek *glycys*, sweet, and *rhiza*, root, most of the dozen or so species (only *G. lepidota* N. American) with sweet, licorice-flavored roots; the specific name means scruffy or scaly, alluding to the glandular-dotted leaves; roots are widely used as a flavoring, the species also assigned significant medicinal value: Blackfoot Indians used poultices of leaves for earache, roots used for toothache and fever, and to strengthen the voice for singing; as well, it was an additive to cough syrup, taken for stomach disorders and to regulate female hormones and adrenaline levels (useful in treating Addisons's disease); wild licorice is an excellent species for revegetating disturbances in moist areas in the prairie region, particularly valuable in binding loose sandy soil on shores, also establishes well in sandy grassland where the water table is high; however, both pods and seeds require scarification, and this may always impair development of the species on a commercial scale.

HEDYSARUM L. - Sweet Broom; Sweetvetch

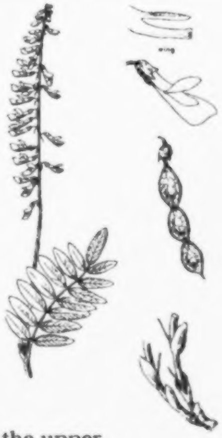
Common Characteristics

- Herbaceous perennials from thick, woody taproots.
- Leaves odd-pinnate, with leaflets obscurely glandular pitted above.
- Keel longer than other petals and truncate.
- Fruit flattened, not opening but constricted and jointed between seeds, breaking into winged segments at maturity.

Key to Hedysarum

1.	Leaflet veins not conspicuous; calyx lobes longer than the tube, nearly equal, very narrow.	*H. boreale*
	Leaflet veins conspicuous; calyx lobes unequal, the upper triangular.	2
2.	Leaflets 9-17; flowers yellowish; segments of loments 2-4, with wide wing margins, 6-9 mm. wide; western species.	*H. sulphurescens*
	Leaflets 15-21; flowers pink-purple; segments of loments 3-5, narrowly winged, 3-5.5 mm. broad; widespread.	*H. alpinum*

Hedysarum alpinum L. ssp. ***americanum*** (Michx.) Fedtsch. - American Hedysarum



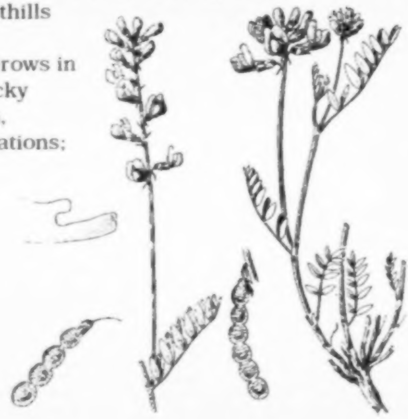
Growth Habit: Plants from a **woody taproot** and thick crown; stems usually several, **tough and woody at base**, prominently ridged and somewhat hairy, **2-7 dm. tall, erect**.

Blades: Lower stems often bladeless, but **with conspicuous red-brown stipules mostly over 1 cm. long**; leaves **15-21 pinnate**, the leaflets 1-3 cm. long, lanceolate-oblong, with abruptly **short-pointed tips**, the **veins conspicuous on both surfaces**, minutely pitted, hairless above, usually sparsely hairy below.

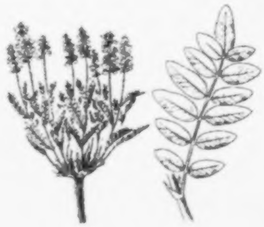
Inflorescence: Racemes **narrow**, the flowers **deflexed**; calyx 4-5 mm. long, hairy, the lobes shorter than tube, **unequal, the lower 3 narrow and longer, the upper shorter and triangular**; flowers **pink to purple** (or white in f. *albiflorum* (St.) Fern), 12-20 mm. long; pods **flattened, segmented and jointed between seeds, hairless to hairy**, the **wings relatively narrow, each segment 3.5-5 mm. broad, pods with 3-5 segments.**

Similar Species:

1. ***Hedysarum boreale*** Nutt. - Northern Hedysarum
   Also common in the foothills and montane regions, occasional elsewhere. Grows in fescue grassland, on rocky slopes and gravelly flats, especially at higher elevations; restricted to moist coulee slopes and snow melt areas in driest regions.
   Differs as follows:
   - Stipules smaller, less than 1 cm. long
   - Blades hairy, at least below.
   - Leaf veins obscure.
   - Calyx lobes mostly equal, longer than the tube.
   - Flowers red-purple, usually not more than 17 mm. long.



2. ***Hedysarum sulphurescens*** Rydb. - Yellow Hedysarum
   Common but restricted to foothills grassland and montane meadows and slopes in the southern Rocky Mountain region. Typically replaces American hedysarum on subxeric ecosites. Very closely resembling *H. alpinum*, differing as follows:
   - Leaflets often fewer, 9-17.
   - Flowers pale yellow.
   - Pods always hairless, with fewer (1-4) segments, but these broader (6-9 mm.) and with broad wing-margins.



Habitat & Distribution:

Common in southern regions, absent from the prairies. Found in fescue grassland, in open woods and low shrubby meadows, on open and often rocky slopes in foothills and mountains. Also in sandy grassland where moisture conditions are favorable.

Forage Value:

Fair; the genus generally rated as moderately nutritious and palatable to game and all classes of livestock (especially so to sheep) throughout most of the season, although extensive utilization is usually an indication of overgrazing; also a favorite food of grizzly bear, particularly in the spring, when excavations for roots in montane areas are not an uncommon sight.

Grazing Response: Increasers #1; the strong woody taproots enable plants to withstand moderately heavy use; as well, the easily-dispersed seed and favorable germination give members of the genus increased reproductive capacity; in abused and altered range, however, *Hedysarum* species will decline and in time disappear; it is interesting to note that well "managed" populations in primary grizzly habitat often increase in cover values, the partial excavations effective in activating increased tillering, a frequent physiological response to soil disturbance.

Notes: From the Greek *hedys*, sweet, and *aroma*, smell, alluding to the pleasant odor of the plants, *alpinum*, because of the montane and alpine habitats the species frequently inhabits; also known as sweet broom or sweetvetch; roots of both *H. alpinum* and *H. boreale* were used rather extensively by aboriginal people, eaten both raw and cooked, and used as a licorice substitute; all three of our hedysarums have ornamental value, *H. boreale* especially showy; as well, they are promising early successional reclamation species, frequently colonizing disturbed areas, adapted to deep, rich soils, but will also survive on rather shallow, rocky, moderately acidic soils in montane regions; unlike most legumes, the pods can be seeded directly and acceptable germination can be obtained.

LATHYRUS L. - Vetchling; Pea Vine

Common Characteristics

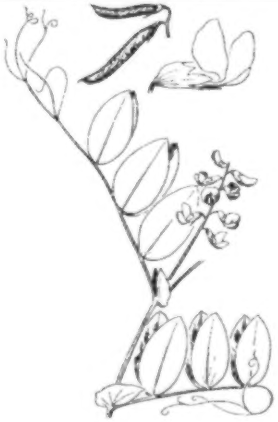
- Perennials (ours) from rhizomes.
- Stems lax, climbing by tendrils, often long (to 1 m.), ridged and somewhat angled but (ours) not winged.
- Leaves pinnate, the terminal leaflet modified as a tendril.
- Style flattened toward top, hairy along inner margin.
- Pods linear, flattened, hairless, several-seeded.

Key to Lathyrus

1. Leaves hairy below; leaflets in 4-6 pairs, stipules small; flowers purple; parkland species. *L. venosus*

Leaves glabrous; leaflets in 3-4 pairs, stipules large, up to 1/2 leaflet length; flowers yellowish-white; widespread. *L. ochroleucus*

Lathyrus ochroleucus Hook. - Cream-colored Vetchling; Cream Pea Vine



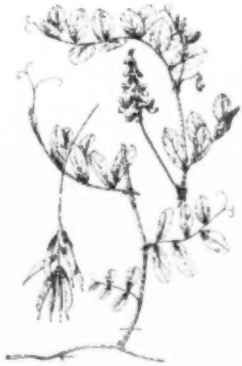
Growth Habit: **Rhizomatous** perennial; stems **up to 1 m. long, hairless,** ridged, **obscurely angled.**

Blades: Leaflets 6 (4-8), **ovate-oval, 2-6 cm. long,** hairless; stipules **large, ovate, about 1/2 as long as leaflets,** often toothed; **tendrils often branched.**

Inflorescence: Racemes **5-10 (12) flowered,** surpassed by leaves; corolla **creamy-white to yellowish-white,** 12-15 mm. long; styles **somewhat flattened, hairy along inner side;** pods narrow, 4-5 mm. long.

Similar Species:

1. ***Lathyrus venosus*** Muhl. - Wild Pea Vine
   Much less common, restricted to a relatively small area in the parkland region. It grows in wooded and shrubby areas, in moist meadows, on streambanks.
   Differs as follows:
   - Plants often taller, often 1 m. or more.
   - Stems finely hairy, distinctly 4-angled.
   - Stipules small, lanceolate, sometimes arrow-shaped, hairy.
   - Leaflets more numerous, 8-12, somewhat larger (3-6 cm. long), finely hairy below and sometimes above.
   - Flowers more numerous, (10) 15-20, purple.



Habitat & Distribution: Common in all regions except the prairies. Grows in open woods and thickets, in clearings. An indicator of fertile, open mixedwood or deciduous ecosites.

Forage Value: Good, both *L. venosus* and *L. ochroleucus* very palatable and with a high nutrient content, the former species with as much as 30% protein in early spring; unfortunately, plants do not cure on the stem, hence are best grazed before frost; wild pea vines make good quality hay, *L. venosus* in particular producing high yields.

Grazing Response: Decreasers; although the rhizomatous growth habit increases resistance to grazing, *Lathyrus* species tend to decline and sometimes disappear, primarily because of their high palatability.

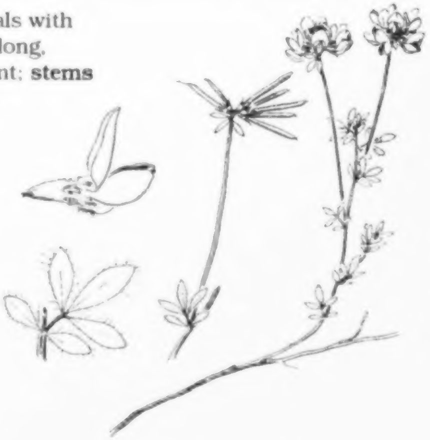
Notes: *Lathyrus*, an ancient Greek name for this or some other member of the legume family, *ochroleucus*, as well as the common name referring to the flower color; pea vines were apparently little used by native people, and are thought to be at least somewhat poisonous to humans; related to the cultivated sweet pea, wild *Lathyrus*, particularly *L. venosus*, make attractive ornamentals; as with all valuable range plants, it is recommended that they be re-introduced into rangelands in reclamation projects; unfortunately, establishment of both native species is difficult: plants show good growth once started, but are very slow to germinate, scarified seed characteristically remaining in the soil for years before its natural dormancy is broken.

LOTUS L. - Bird's-foot Trefoil

Lotus corniculatus L. - Bird's-foot Trefoil

Growth Habit: Non-rhizomatous perennials with several stems 1-4 (6) dm. long, glabrous to finely pubescent; **stems spreading-reclining, often rooting at the nodes**.

Blades: **Leaves pinnate, 5-foliate, the lower pair becoming remote (stipule-like); leaflets 5-17 mm. long, elliptic-obovate**, often sharp-pointed, the margins minutely toothed; leaflets glabrous to thinly hairy; true stipules minute.



Inflorescence: **Flowers in umbel-like arrangements** of 2-10; **flowers 8-15 mm. long, showy, bright yellow and often tinged with red**; pods 2-4 cm. long, 2-3 mm. broad.

Habitat & Distribution: An introduced species, occasionally used as forage and in reclamation efforts.

Forage Value: Good, a non-bloat legume, palatable throughout most of the growing season, and with protein content 25% or more in early growth stages, dropping to 19-20% by mid-summer; probably the greatest deterrent in using trefoil as a forage species is its relatively low production as compared to other agronomic legumes.

Grazing Response: An invader, introduced as a forage species from Europe.

Notes: *Lotus*, a Greek name for the species, *corniculatus* translates horned, a reference to the appearance of the pods; the common name, because the leaf shape is suggestive of a bird's foot; trefoil is an excellent species for use in revegetating disturbances, growing readily from seed but not intrusive, and as such, allows native plants to return to the site over time; in southern regions, native *Lotus* species are widely grown as ornamentals.

LUPINUS L. - Lupine

Common Characteristics

- Annual to herbaceous (or basally somewhat woody) perennials, with slender to elongate, woody taproots.
- Leaves palmately compound, not glandular.
- Racemes terminal.
- Calyx asymmetrical.
- Standard broad, often hairy on back, its sides reflexed.
- Wings curved, united near tips to enclose keel.
- Keels sickle-shaped.
- Stamens 10, united into one unit.
- Pods opening, flattened, hairy, 2-12 seeded, often somewhat constricted between seeds.

Key to Lupinus

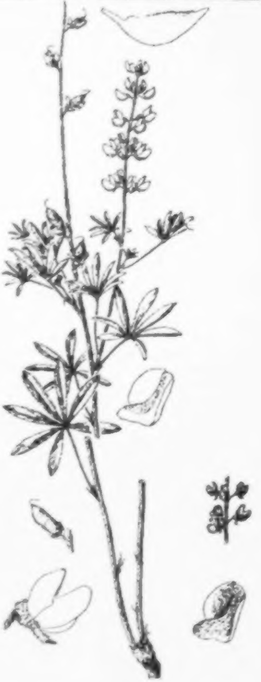
1. Annuals to 25 cm. tall; pods 2-seeded; plants of dry sandy habitats. *L. pusillus*

   Perennials, plants taller, pods with up to 6 seeds. 2

2. Leaves sparsely hairy to glabrous above; standard glabrous on back. *L. argenteus*

   Leaves hairy above; standard hairy on back. *L. sericeus*

Lupinus sericeus Pursh - Perennial Lupine; Silky Lupine



Growth Habit: Perennials **from woody taproots** and thick branching crowns; stems several, **2-6 (8) dm. tall**, somewhat branched above, **silvery to rusty-hairy** with short as well as longer silky hairs, not hollow.

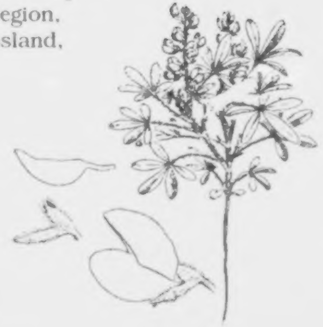
Blades: Leaves mostly cauline, the lower long-stalked; leaflets **5-10, palmate, oblanceolate, 3-6 (8) cm. long, equally silky-hairy on both sides.**

Inflorescence: Racemes dense to rather loose, **to about 15 cm. long, stalks and calyx rusty-hairy**; flowers about 1 cm. long, **blue-purple** (a pink form and also white forms occur): **standard hairy over about 2/3 of back**, usually yellow-white in centre; keels hair-fringed; pods 2-3 cm. long, flattened, hairy.

Similar Species:

1. ***Lupinus argenteus*** Pursh - Perennial Lupine
   Generally less common, occurring further south.
   Differs as follows:
   - Plants somewhat taller, 5-10 dm. tall, and often more branched above.
   - Leaflets usually hairless, or only slightly hairy above.
   - Racemes often slightly longer and more open.
   - Standard hairless on the back.

2. ***Lupinus pusillus*** Pursh - Annual Lupine
   Locally abundant in the prairie region, found in open dunes, sandy grassland, on disturbed sandy sites.
   Distinguished as follows:
   - Plants annual.
   - Plants spreading and branched from base, reclining, to 2.5 dm. tall; hirsute.
   - Leaflets about 5, 2-3 cm. long, glabrous above.
   - Flowers pink-purple-tinged to whitish.
   - Pods 2-seeded, about 2 cm. long.



Habitat & Distribution:

Common but restricted to the southern foothills and montane ecoregions. Grows in fescue grassland, in montane meadows, in open woods.

Forage Value:

Poor, lupines provide inferior quality forage, rarely eaten by cattle, more often consumed by horses, sheep and elk; both our perennial lupine species are toxic due to the presence of lupanine alkaloids, the seeds and pods containing highest concentrations of poison; sheep are most susceptible to poisoning, this because they tend to be the primary users of the species; although pastures containing lupine are often grazed with no ill effects, especially heavy infestations can cause problems if other vegetation is scarce, after pod formation, and if native hay with a high lupine content is fed.

Grazing Response:

Increasers (both perennial species), usually an indicator of heavy grazing, although naturally high populations sometimes occur in good condition rangelands.

Notes:

From *Lupus*, the Latin word for wolf, possibly because lupines were once thought to rob the soil of its fertility; the specific name *sericeus* is a reference to the silvery-silky leaflets; although roots and seeds of some species were apparently eaten by N. American Indians and in some European regions, our species are toxic to humans, and there is little evidence that they were used; lupines are well known for their spectacular flowers, both *L. sericeus* and *L. argenteus* frequently varying in color from blues and purples to pink and white; these species show potential for development on a commercial scale, recommended as ornamentals and in reclamation mixes; of the two perennials, *L. argenteus* appears by far easier to establish, showing superior germination and seedling vigor; the annual *L. pusillus* is a promising early successional species for sandy areas in the prairie region.

MEDICAGO L. - Medick

Common Characteristics

- Non-native annuals or perennials with taproots.
- Leaves 3-foliate, the terminal leaflet stalked.
- Leaflets toothed around the top.
- Flowers small, in short heads or spike-like racemes.
- Corolla blue-purple (sometimes pale) to yellow.
- Stamens 10, in groups of 9 and 1.
- Pods 1-several seeded, sickle-shaped to spirally coiled, not opening.

Key to Medicago

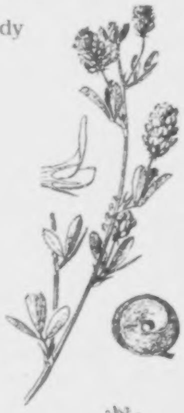
1. Small annuals; plants reclining; corolla yellow, about 3 mm. long; pods kidney-shaped, black, with 1 seed. *M. lupulina*

   Larger perennials; corolla more than 3 mm. long; pods with several seeds. 2

2. Corolla blue-purple; pods in a spiral coil. *M. sativa*

   Corolla yellow; pods straight to curved. *M. falcata*

Medicago sativa L. - Alfalfa; Lucerne



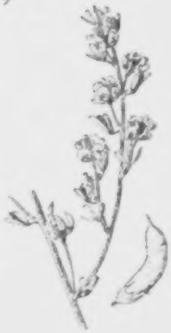
Growth Habit: Perennials **from deep, woody taproots** and a woody crown; stems 3-10 dm. tall, hairless to finely hairy, ridged.

Blades: Leaflets **(3) oblanceolate-oblong, 1-3 cm. long, sharply toothed around top**, abruptly short-pointed, often hairy, especially below.

Inflorescence: Flowers often numerous (20-100), **to 10 mm. long, in a short oblong raceme 2-3 cm. long, blue-purple**, sometimes pale; pods **1-3 times coiled**, with several (up to 10) seeds, usually hairy.

Similar Species:

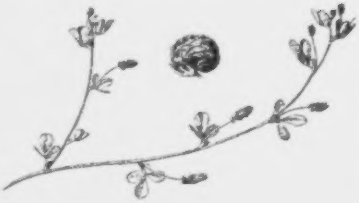
1. ***Medicago falcata*** L. - Yellow Lucerne; Sickle Medick
   Although intermediates between *M. falcata* and *M. sativa* frequently occur (plants with intermediate characteristics, flowers tinged with yellow and purple), pure stands of *M. falcata* are not as common.
   It differs from *M. sativa* as follows:
   - Leaflets narrower, linear-oblong.
   - Flowers yellow, smaller, 5-8 mm. long.
   - Pods fewer seeded and sickle-shaped to nearly straight.



2. ***Medicago lupulina*** L. - Black Medick

Rather common, found in waste and disturbed places. Differs as follows:

- Small annual.
- Stems wide-spreading, 2-8 dm. long.
- Flowers (yellow), about 3 mm. long.
- Pods kidney-shaped, 1-seeded.



Habitat & Distribution:

Introduced and commonly grown as a forage crop throughout all regions. Sometimes used in reclamation work, occasional as an escape.

Forage Value:

Good, nutrients well-balanced, the foliage especially renowned for its high protein and mineral content; alfalfa is used primarily as a hay crop, and is known to increase nutrient value and palatability and to lengthen the life of perennial grasses; as well, it is adapted to a wide variety of moisture conditions, tolerant of drought, also thriving in high rainfall zones and under irrigation; although a good quality pasture species, alfalfa contains saponin which will cause bloat in livestock when pastures have more than 50% alfalfa, irrigated and wet forage especially toxic; alfalfa hay is generally safe except if not well cured; it is also known to contain photosensitizing agents, although actual cases of poisoning are uncommon.

Grazing Response:

An invader, Eurasian, introduced into N. America in the early 18th century; a common species, but not considered invasive in rangeland.

Notes:

From the Greek *medice*, the name applied to alfalfa introduced by the Greeks from Media; *sativa*, meaning cultivated (not wild), the specific name for *M. falcata* referring to the sickle-shaped pods; the term alfalfa is from the Arabic "father of all food", the genus long recognized for its high content of vitamins, protein, and other varied elements; alfalfa is consumed in salads, grown as sprouts, and the seeds can be ground into flour; as well, alfalfa tea is reputed to cure a number of ailments, used as a diuretic, for bowel and digestive problems, and supposedly has antifungal and estrogenic properties; both yellow and blue flowered species are rather widely used in reclamation, valued for their ability to bind and improve soils and for their tolerance of a wide range of moisture conditions, although best adapted to deep, well drained soils, and tolerance of acidity is low; alfalfa is not as invasive as sweet clover, but its use in native rangeland should be discouraged as alternative native legumes become commercially available.

MELILOTUS Mill. - Sweet Clover

Common Characteristics

- Taprooted annuals or biennials with a characteristic sweet odor.
- Stems stout, mostly hairless, erect, freely branched, 8-25 dm. tall.
- Leaves 3-foliate, the terminal leaflet stalked.
- Leaflets toothed to near base, 1-3 cm. long.
- Racemes narrow, elongate, several.
- Flowers small, white or yellow, early deciduous.
- Stamens 10, in groups of 9 and 1.
- Pods short, ovoid-spherical, mostly not opening, 1-2 seeded, reflexed.

Key to Melilotus

1. Flowers yellow, 5-6 mm. long; pods wrinkled; seeds olive green and often purple-spotted. *M. officinalis*

Flowers white, 4-5 mm. long; pods not wrinkled but net-veined; seeds yellow. *M. alba*

Melilotus officinalis (L.) Lam. - Yellow Sweet Clover

Growth Habit: **Biennial** from a **strong, deep taproot**, stems green, strongly ridged, **to 25 dm.** tall, freely branching above, nearly hairless.

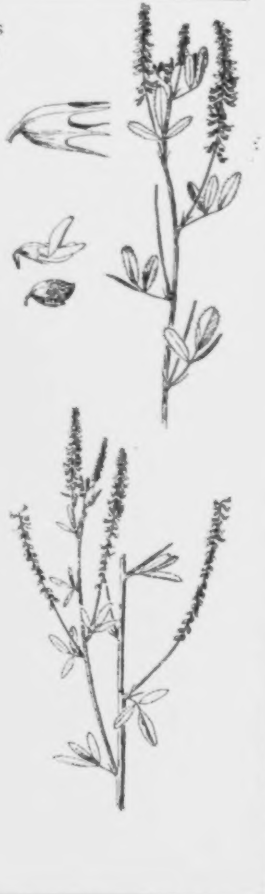
Blades: **3-divided**, the terminal leaflet stalked; leaflets **1-3 cm. long, toothed to near the base.**

Inflorescence: Racemes **narrow, elongate**, lax, about 3-10 cm. long; flowers **yellow, 5-6 mm. long**, the standard about equal to wings in length; pods **short, ovoid-spherical, wrinkled**, with 1-2 seeds, these **olive-green, often purple-spotted**.

Similar Species:

1. ***Melilotus alba*** Desr. - White Sweet Clover
   Differs as follows:
   - Corolla white, somewhat smaller, 4-5 mm. long, the standard slightly exceeding wings.
   - Pods net-veined, not wrinkled.
   - Seeds yellow at maturity.

Habitat & Distribution: Common as an introduced species.



Forage Value: Good, nutrient content well-balanced and at acceptable levels early in the season, but dropping significantly at maturity; sweet clover is palatable in the spring, but plants (especially *M. alba*) become coarse and stemmy by mid-summer, and also progressively less attractive as the bitter coumarin taste becomes more pronounced; although it produces fairly good hay when cut early, poorly cured or moldy hay can be toxic, the non-poisonous substance coumarin converted to dicoumarol which causes hemorrhaging.

Grazing Response: Invaders, both species Eurasian in origin; although biennial, and thus short-lived, sweet clover is often persistent in rangeland, readily re-seeding itself and capable of invading large acreages in areas where vegetation cover is normally rather sparse.

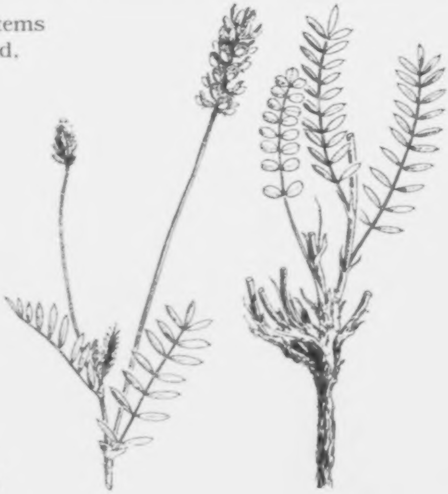
Notes: From the Greek *meli*, honey, and *lotos*, the name for clover-like plants, the specific name *officinalis* originates from the use of foliage and flowers in pharmaceutical products (*alba* referring to the white flowered species); the common name is most appropriate, the genus long recognized as a choice source of nectar for bees; sweet clover has been used rather extensively in reclamation work, valued for its adaptation to a wide variety of soils and moisture regimes; however, it has been viewed with increasing suspicion in recent years because of its persistent and invasive nature; as native legumes become more readily available, they should be substituted as superior alternatives on sites where the ultimate goal is to return to an indigenous species composition.

ONOBRYCHIS Mill. - Sanfoin

Onobrychis viciifolia Scop. - Sainfoin

Growth Habit: Taprooted perennials; stems erect, 2-6 dm. tall, ridged, glabrous to thinly pubescent above.

Blades: **Leaves pinnate, with 11-25 oblong-oblanceolate and sharp-pointed leaflets 1-2 cm. long;** leaflets thinly pubescent and with **conspicuous raised veins below, glabrous**



and with fine dark glandular dots above; stipules membranous, **to 12 mm. long, reddish-brown.**

Inflorescence: Racemes dense, 10-50-flowered; calyx bell-shaped, the lobes narrow and much longer than the tube; **flowers 10-12 mm. long, pink-purple, distinctly striped**; stamens 10, pods ovate, 6-8 mm. long, indehiscent, **pubescent and prominently rugose, with short, stout spines, 1-seeded.**

Habitat & Distribution: An introduced species, occasionally used for reclamation and as forage.

Forage Value: Good, the plants both palatable and nutritious, with protein content averaging about 28% in early summer; sanfoin is useful in pasture mixes as it does not cause bloat.

Grazing Response: Invaders, introduced from Europe, but rarely invasive in native rangeland.

Notes: *Onobrychis* is the ancient Greek term for the plant, the specific name suggestive of *Vicia*, translating "to bind together" (tendril), which can more correctly be applied to vetches; sanfoin has been grown successfully as a reclamation species in recent years, often as a preferred substitute for the much more aggressive sweet clovers (*Metilotus* ssp.).

OXYTROPIS DC. - Loco-weed

Common Characteristics

- Densely tufted perennials from taproots and multiple caudices.
- Stems mostly lacking (except in *O. deflexa*).
- Leaves pinnate or in whorls, not glandular; hairy, often densely so.
- Flowers in spikes or in racemes.
- Flowers white, yellow or purple.
- Wings 2-lobed, mostly shorter than keel.
- Keel prominently beaked at top.
- Pods membranous or hardened, often inflated.
- Seeds several, kidney-shaped.

Key to Oxytropis

1. Plants usually with evident stems with at least one node (caulescent); pods drooping. *O. deflexa*

Plants without nodes (acaulescent); pods erect to spreading. 2

2. Flowers blue-purple. 3

Flowers predominantly yellow (*O. monticola* sometimes purple-tinged). 4

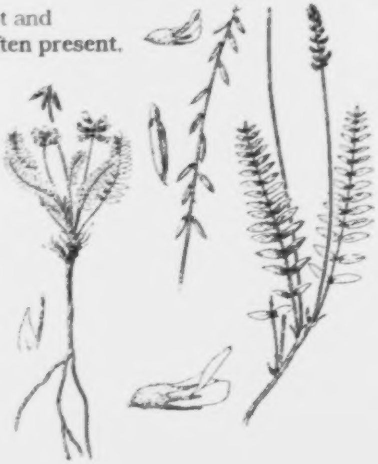
3. Leaflets in whorls, silvery. *O. splendens*

Leaflets not in whorls; foliage not silvery, but glandular. *O. viscida*

4. Leaflets 11-17; keels 15-20 mm. long; pods thickened-rigid at maturity. *O. sericea*

Leaflets 17-33; keels 11-15 mm. long; pods not thickened-rigid, more membranous. *O. monticola*

Oxytropis deflexa (Pall.) DC. - Reflexed Loco-weed



Growth Habit: Caespitose, from a stout taproot and branched caudex; **true stems often present,** having one or more nodes; stems ascending, 5-35 cm. tall, spreading-pubescent.

Blades: Leaflets numerous (15-30), opposite, elliptic-lanceolate, 5-15 mm. long, grey to green and hairy on both surfaces; stipules foliaceous, green-purplish, free from base of petiole, hairy dorsally; blades mostly basal, **but usually with at least one cauline; blades appearing flattened.**

Inflorescence: Racemes at first spike-like, 5-25-flowered, **slightly to greatly elongating in fruit**; calyx mostly more than half the length of the corolla, pubescent with white and blackish hairs, the lobes narrow, about equal to the tube; **flowers 6-10 mm. long, pale to dark blue-purple, drooping and often one-sided with age; keels with relatively short, blunt beaks; pods reflexed on a short stipe, dark-hairy, oblong**, one-celled, the upper suture slightly intruding.

Related Species: The true var. *deflexa* is uncommon locally. Instead, there are two other varieties, the first, var. *foliolosa* tending to be more montane, and the second, var. *sericea* more widespread.

1. Var. ***foliolosa*** (Hook.) Barneby
    - Plants usually without stems, the leaves mostly basal.
    - Pubescence often sparse, the foliage green.
    - Inflorescence remaining compact, fewer (7-10)-flowered.
    - Flowers often 1 cm. long, blue-purple.
    - The sinuses between calyx teeth broad.

2. Var. ***sericea*** T. & G.
    - Plants with stems, with 1 or more nodes.
    - Pubescence dense, the foliage grey-green.
    - Inflorescence greatly elongating (to 15 cm.) in fruit.
    - Flowers 10-40, pale blue, smaller, 6-8 mm. long.
    - The lateral sinuses narrow, acute.

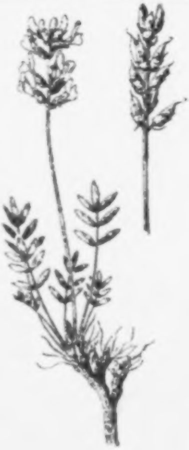
Habitat & Distribution: Frequent in the foothills, montane and parkland regions, occasional northward and at higher elevations. Found in fescue grassland, in open woods and moist thickets, on stream banks, on roadsides and on other disturbances.

Forage Value: Poor, generally unpalatable and producing little herbage; *O. deflexa* has not been listed among loco-weeds causing "loco" poisoning, and although it may be a suspect, would rarely provide enough forage to produce symptoms.

Grazing Response: Increasers but not invasive.

Notes: Both the common and specific names refer to the downward-pointing pods; *O. deflexa* is an excellent early successional species, moving in naturally along roads and trails, providing good vegetation cover but without a tendency to take over.

Oxytropis sericea Nutt. var. ***spicata*** (Hook.) Barneby - Early Yellow Loco-weed



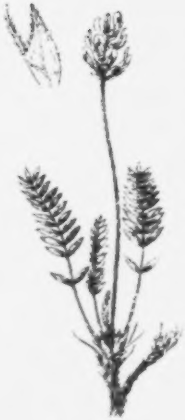
Growth Habit: **Densely tufted** perennials **from deep taproots** and woody, branched caudices; **stalks leafless**, erect-ascending, 10-25 (30) cm. long, hairy.

Blades: Leaflets **11-17**, **opposite or subopposite, silky hairy on both surfaces**, usually densely so and **silvery/grey-green**, ovate to oblong-lanceolate; leaves 5-30 cm. long; stipules membranous, **densely silvery-silky hairy and often conspicuous at plant base.**

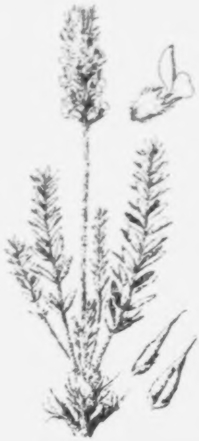
Inflorescence: Racemes **spike-like**, 10-35 flowered, elongating in fruit; calyx about 1/2 as long as corolla, white and black-hairy; corolla **pale to deep yellow**, **18-22 mm. long**, the **keels 15-20 mm. long**, the wings conspicuously broadened to at least 5 mm. wide at top; pods nearly stalkless, **oblong**, 1.5-2.5 cm. long, **white and black-hairy, the wall rigid, hardened and about 0.5 mm. thick at maturity.**

Similar Species:

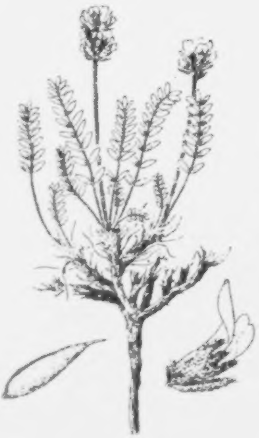
1. ***Oxytropis monticola*** A. Gray ssp. ***monticola*** - Late Yellow Loco-weed
   Common in the foothills, montane and parkland regions, occasional elsewhere. Indicates drier conditions in montane habitats.
   Differs as follows:
   - Leaflets more numerous (17-33).
   - Stipules less conspicuous at plant base.
   - Flowers sometimes purple-tinged, smaller (12-17 mm. long), wings narrower; keels 11-15 mm. long.
   - Pods with walls more membranous, less than 0.5 mm. thick.



2. ***Oxytropis splendens*** Dougl. *ex* Hook. - Showy Loco-weed
   Common in the foothills and montane regions, occasional elsewhere. Grows in open woods, on rocky slopes and banks, in open grassland, on gravelly river flats.
   Distinguishing features:
   - Stems and leaves densely silvery-silky hairy.
   - Leaflets in whorls.
   - Flowers red-purple.



3. ***Oxytropis viscida*** Nutt. - Sticky Loco-weed
   Frequent in southern foothills and montane regions. Found in disturbed gravelly areas, on dry hillsides, on exposed, rocky slopes and banks.
   Distinguishing features:
   - Leaves more or less opposite; hairs sparse.
   - Blades, stems, calyx, and pods viscid with small, yellowish glands.
   - Flowers blue-purple.



Habitat & Distribution:

Frequent in foothills, montane and parkland regions, occasional in the prairies. Found on dry hillsides, montane slopes, in open prairie grassland, fescue grassland, sometimes on sandy shores.

Forage Value: Poor, the actual nutrient content unclear, but considered inferior to that of choice range species; loco-weeds as a whole are unpalatable, and are usually only eaten when better forage is scarce; early yellow loco-weed is well known as the cause of "loco" poisoning in livestock (horses are most susceptible), characterized especially by erratic behavior; the toxic substance locoine (this not yet fully identified) is present in all parts of the plant, and remains after drying; infested pastures can usually be safely grazed, but scarcity of other forage will increase consumption of loco-weeds, and a narcotic effect can result, animals then seeking loco-weeds at the exclusion of other forage. *Note:* Two additional native loco-weeds are also suspect, *O. splendens* and *O. monticola*, although cases of poisoning are much less common, possibly due to lower levels of toxins.

Grazing Response: Increasers (all mentioned species).

Notes: *Oxytropis*, from the Greek *oxys*, sharp, and *tropis*, keel, an obvious reference to the beaked keel, the common name describing the foliage; although human use of the genus was rather limited (probably due to toxic properties of some species), Blackfoot Indians used seeds in ceremonial rattles, and leaves of some species were chewed to relieve sore throats; all of the above mentioned species have considerable potential as ornamentals, adapted to rather dry sites, and are recommended as early successional reclamation species; they are frequently pioneers on disturbances, growing well on rather shallow, often rocky infertile soils and all except *O. sericea* tolerant of at least moderate soil acidity.

PETALOSTEMON Michx. - Prairie Clover

Common Characteristics

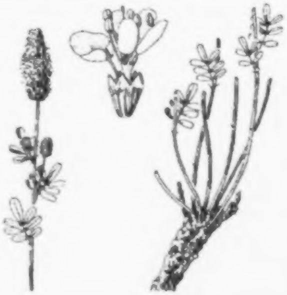
- Perennials from thickened, woody taproots, woody and rather compact crowns.
- Leaves pinnate with rather few (3-9) leaflets.
- Leaflets glandular-dotted below.
- Flowers very small, in dense spikes, white to pink or purple.
- Calyx with 5 nearly equal, narrow lobes; nerves usually prominent.
- Corolla irregular and unusual: standard broad and attached by a broader claw (the typical form), remaining 4 petals similar to each other, narrow, positioned between the 5 fertile stamens, thus often viewed as sterile stamens.
- True stamens 5, exserted.
- Pods small, not opening and usually contained within the calyx, 1-2 seeded.

Key to Petalostemon

1. Leaflets 3-5, linear; flowers pink-purple; calyx hairy. *P. purpureum*

Leaflets 5-9, oblong-oblanceolate; flowers white; calyx hairy only on lobes. *P. candidum*

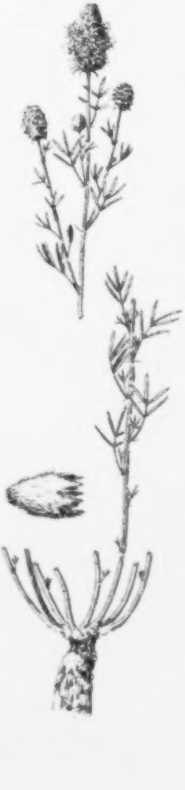
Petalostemon candidum (Willd.) Michx. - White Prairie Clover



Growth Habit: Plants from **long, thick woody roots** and compact, woody crowns; stems several, **reclining to erect**, hairless.

Blades: Leaflets **5-9, oblong-oblanceolate, truncate to notched** and sometimes abruptly short-pointed at top, **5-30 mm. long**, hairless, **dark glandular-dotted beneath**.

Inflorescence: Spikes **2-5 cm. long, compact, cylindric**; bracts exceeding calyx, long-pointed, conspicuous; calyx tube distinctly ribbed, and **only lobes hairy**; **corolla white; flowers very small, all petals but the standard very narrow**; pods small, not splitting, usually **remaining in the calyx**.



Similar Species:

1. ***Petalostemon purpureum*** (Vent.) Rydb. - Purple Prairie Clover
Found in similar habitats across southern regions. Its range extends somewhat further north, to the N. Saskatchewan River.
Differs as follows:
   - Stems hairless to somewhat hairy, especially above.
   - Leaflets fewer (3-5 (7)), linear, often rolled, to 2 cm. long.
   - Entire calyx hairy.
   - Flowers purple.

Habitat & Distribution: Frequent in the prairies, occasional in southern foothills and parkland regions. Grows in open prairie grassland, in drier sites in fescue grassland, on open slopes and hillsides.

Forage Value: Fair.

Grazing Response: An increaser #1 (both species), fairly resistant to heavy grazing and trampling, also drought tolerant but disappearing when overgrazing depletes and alters rangeland.

Notes: From the Greek *petalon*, petal and *stemon*, stamen, in reference to either the union of petals and stamens or to the presence of petal-like stamens; specific and common names of both species describe flower color; the Blackfoot people made poultices of prairie clover leaves to apply to wounds, *P. candidum* apparently more widely used, a tea made from the foliage, a decoction of leaves used as a prophylactic, and the root chewed because of its pleasant flavor; prairie clovers are attractive additions to arid flower gardens, and may also be of some value in reclamation; some preliminary development of *P. purpureum* is currently under way, although the species appears to be difficult to establish from seed.

PSORALEA L. - Bread-root

Common Characteristics

- Perennials with rhizomes or thickened, tuberous roots.
- Foliage mostly glandular-dotted.
- Leaves alternate, palmately 3-5 divided.
- Racemes small, axillary, spike-like to interrupted.
- Calyx lobes subequal or the lower somewhat longer.
- Flowers white to purple, the standard only slightly exceeding other petals.
- Stamens mostly 10 or rarely 9.
- Pods short, globose, indehiscent but often irregularly splitting, often beaked, 1-seeded, mostly enclosed by calyx.

Key to Psoralea

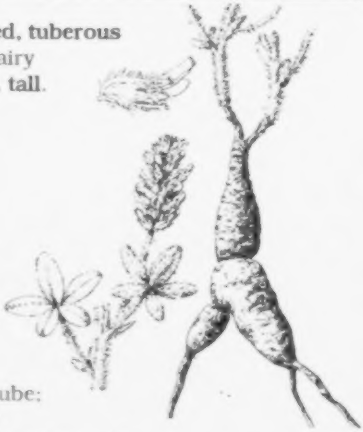
1. Plants from strong, thickened taproots; flowers about 1.5 cm. long. *P. esculenta*

Plants from elongate rhizomes; flowers mostly less than 1 cm. long. **2**

2. Plants silvery-hairy; calyx lobes unequal; flowers 7-10 mm. long. *P. argophylla*

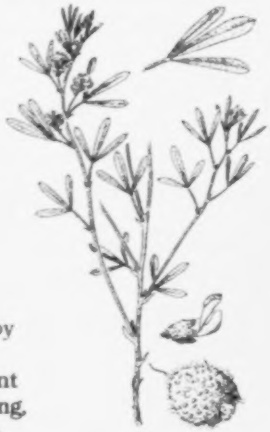
Plants green and glabrous to sparsely hairy; calyx lobes nearly equal; flowers 5-6 mm. long. *P. lanceolata*

Psoralea esculenta Pursh - Indian Bread-root



Growth Habit:	**Perennials from greatly thickened, tuberous taproots**; stems erect, densely hairy **with bristly white hairs, 1-3 dm. tall.**
Blades:	**Blades mostly cauline on long petioles**, these with spreading pubescence similar to that of stems; **leaves 3-5 palmate, hairy below, glabrous above, not glandular; leaflets elliptic-obovate, 2-6 cm. long.**
Inflorescence:	**Racemes dense**, 2-10 cm. long; calyx not glandular, hairy, the lobes slightly exceeding the tube; **corolla 1.2-1.5 cm. long, cream-colored and blue-tinged to blue-purple; pods ovoid**, with a slender beak twice as long as the body; pods usually splitting in the middle to expose flattened, brownish seeds.
Habitat & Distribution:	Scattered throughout southern regions. Grows in dry prairie grassland, in sandy areas, and west to the lower foothills, where it is found in dry, rather exposed locations.
Forage Value:	Poor.
Grazing Response:	An increaser, the tough, heavy root system resistant to considerable trampling, and allowing a competitive advantage in droughty conditions.
Notes:	The generic name originates from the Greek *Psora*, itch or mange, something of an exaggerated reference to the scab-like glands; Indian bread-root is probably one of the better known food plants of various aboriginal tribes, roots gathered late in the season and eaten raw, roasted, or dried for winter use; medicinally, the plant was used to treat bowel problems, and the root chewed on by teething children; the species has earned a spot among place names in southern Alberta – "Turnip Butte" near Lethbridge, "Many Prairie Turnips" near Cowley; *P. esculenta* was apparently also used by early settlers, and briefly cultivated in France as a potato substitute.

Psoralea lanceolata Pursh - Scurf Pea



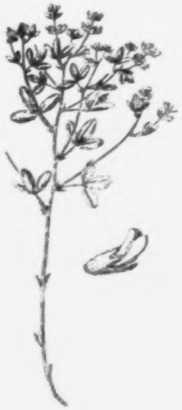
Growth Habit: **Perennials from extremely elongated, branching rhizomes**; stems reclining to erect, 2-6 dm. tall, freely branched, **yellow-green, hairy to glabrous, dark glandular-dotted.**

Blades: **Leaves 3 (5)-palmate, yellow-green, dark glandular on both surfaces, mostly glabrous**, long-stalked, cauline; leaflets 1.5-3 cm. long, **oblanceolate to linear**.

Inflorescence: **Racemes dense, short**, usually exceeded by the leaves; calyx to 2.5 mm. long, **with subequal, short triangular teeth, pubescent and glandular-dotted; flowers 5-6 mm. long, white with keel bluish**; pods globose, with short beaks, 4-5 mm. long, glabrous to pubescent, **conspicuously dark-glandular dotted**.

Similar Species:

1. ***Psoralea argophylla*** Pursh - Silver-leaf Psoralea
   Also a rhizomatous species of sandy soil, occasional in the prairie region.
   Differs as follows:
   - All foliage densely silvery-pubescent, the upper leaf surface somewhat less densely so.
   - Glands present on leaves, best seen on upper surface.
   - Leaflets 3-5, 2-4 cm. long, obovate.
   - Flowers 2-4 per node in an interrupted, whorled spike (whorls 1-3 per spike).
   - Calyx lobes unequal, the lowest long, often the length of the corolla.
   - Flowers blue-purple, 7-10 mm. long.
   - Pods ovoid, to 8 mm. long, silky-pubescent.



Habitat & Distribution: Confined to the southern prairies where it can be considered locally abundant. Grows in sand, both in open dunes and in vegetated areas, often associated with *Opuntia polyacantha*, sagebrush and rose.

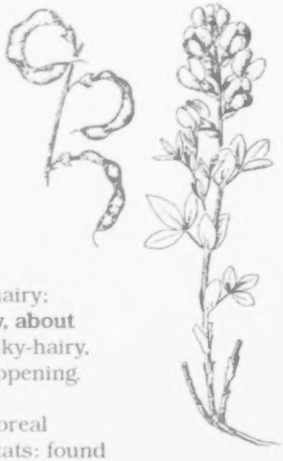
Forage Value: Poor, unpalatable, and the pods of *P. argophylla* possibly mildly toxic.

Grazing Response: Increasers, *P. lanceolata* especially aggressive in response to declining range condition; in some areas where exposed sandy soil naturally occurs, populations can be high and not necessarily an indication of overgrazing.

Notes: Members of the genus have been variously used medicinally, known to have astringent, emetic and tonic properties, although the seed pods of *P. argophylla* are apparently somewhat toxic; rhizomatous psoraleas have excellent soil binding properties, *P. lanceolata* especially capable of forming dense colonies on disturbed sandy sites.

THERMOPSIS R. Br. - Golden Bean

Thermopsis rhombifolia (Nutt.) Richards. - Golden Bean



Growth Habit: Perennials **from thick, woody rhizomes**; stems ascending-erect, **1-4 dm. tall**, hairless and angled, branched above.

Blades: Leaves **with 3 leaflets**, the leaflets **obovate-oval, 2-3 cm. long, entire**, mostly hairless; stipules **large, leaf-like, ovate-cordate**.

Inflorescence: Flowers in short, bracteate racemes, the bracts and calyx usually somewhat hairy; flowers **conspicuous, deep golden-yellow, about 2 cm. long**; stamens 10; pods usually silky-hairy, **flat, 4-8 cm. long, semicircular-curved**, opening.

Habitat & Distribution: Very common in all regions except the boreal forest. Adapted to a wide variety of habitats: found in open sandy grassland, open woods, fescue grassland, on hillsides, ravines and in depressional grassland in driest regions.

Forage Value: Poor; although actual nutritional content is unclear, plants are unpalatable, and utilization of the species to any extent indicates rangeland is in an overgrazed and depleted condition; golden bean contains the alkaloid cytistin and seeds have apparently been responsible for livestock poisoning, although these reports may be unfounded.

Grazing Response: An increaser, the deep extensive rhizome system very resistant to trampling and drought, and plants also spread readily by seed as they are left ungrazed.

Notes: From the Greek *thermos*, lupine, and *opsis*, resemblance, as many species are similar to lupines; also called buffalo bean, false lupine, golden pea; native people used the flowering of the species as an indicator of the season, Blackfoot specifically noting this as the time buffalo bulls moved to their summer range, hence the name buffalo bean; *T. rhombifolia* has been blamed for numerous human poisonings in the past, native children most affected, as they were attracted to both early vegetative growth and pods; golden bean is not a desirable species for revegetating native rangeland, but can be recommended as an early successional species for ornamental purposes and reclaiming non-grazed areas that are prone to erosion; it is adapted to a wide variety of soil types and textures (but probably not to Solonetzic soils) and is recommended throughout most southern regions; the species is somewhat difficult to establish from seed even after scarification, possibly due to a natural germ dormancy; as with other strongly rhizomatous species, golden bean can be successfully propagated by root sprigs.

TRIFOLIUM L. - Clover

Common Characteristics

- Introduced annual, biennial or perennial herbs with taproots or rhizomes.
- Leaves palmately 3-divided into broad, toothed leaflets.
- Racemes compact, spherical.
- Flowers white, yellow to pink-purple, withering-persistent in fruit.
- Pods spherical to elongate, small and usually included in calyx, mostly not opening, 1-several seeded.

Key to Trifolium

1. Flowers reddish, sessile in heads, 12-20 mm. long; 1-2 leaves commonly below heads. *T. pratense*

Flowers white-pink, stalked, 7-11 mm. long; heads without leaves below. 2

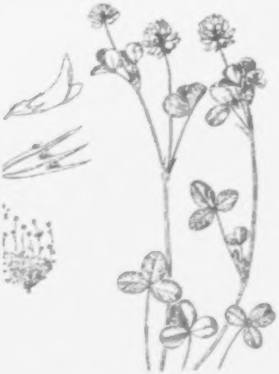
2. Leaflets 2-4 cm. long, ovate-elliptic, without white markings; flowers pink; plants not stoloniferous. *T. hybridum*

Leaflets 1-2 cm. long, mostly with a white marking on upper surface; flowers white or pink-tinged; plants stoloniferous. *T. repens*

Trifolium hybridum L. - Alsike Clover

Growth Habit: **Taprooted** perennial with hairless foliage; stems **ascending-erect** (rarely stoloniferous), 2-8 dm. tall.

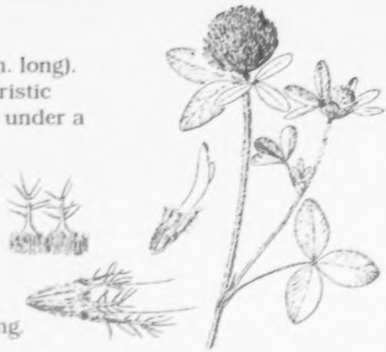
Blades: Palmately 3-divided, the leaflets **2-4 cm. long, oval** (obovate), the top rounded to notched, **toothed**, green, **without paler "water marks"**, hairless to sparsely hairy.



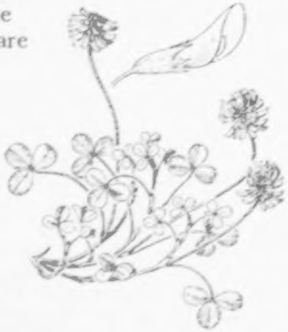
Inflorescence: Heads **spherical**, stalked, stalks 2-8 cm. long, in leaf axils; flowers **5-9 mm. long**, reflexed, on distinct stalks, **pink**; calyx with linear teeth about equalling the tube; pods **small, remaining in the calyx**, each with 1-4 dark green seeds.

Similar Species:

1. *Trifolium pratense* L. - Red Clover
Introduced, common.
Differs as follows:
   - Leaflets larger (2-5 cm. long).
   - Leaflets with characteristic markings: a pale area under a darker inverted "V".
   - Stipules conspicuous, oval, with red veins.
   - Heads short-stalked, each with 2 leaves below.
   - Flowers reddish, sessile, 12-20 mm. long.



2. *Trifolium repens* L. - White Clover; Dutch Clover
Introduced and common throughout, more common as an escape than the preceding species. Native elements are also possibly present.
Distinguished as follows:
   - Plants creeping by means of reclining, rooting stems.
   - Leaflets 1-2 cm. long.
   - Leaflets with a white blotch ("water mark") on upper surface.
   - Heads small (1-2 cm. broad).
   - Flowers white-cream and pink-tinged, stalked, 8 mm. long.



Habitat & Distribution: Introduced, widely grown throughout most regions.

Forage Value: Good, all species with good nutrient levels and a high protein content, also palatable most of the season; white clover, with its low creeping growth habit and resistance to grazing, is best suited as a pasture species, and generally does not cause bloat unless exceptionally large amounts of wet foliage are consumed; *T. hybridum* is rated as somewhat less palatable, but also less likely to cause bloat; a short-lived but very productive species, red clover is best suited for use as hay and silage; all species have considerable moisture requirements, and also grow well under irrigation.

Grazing Response: Invaders, of European origin, *T. repens* by far the most aggressive and resistant to grazing and trampling; however, true clovers are not considered troublesome because of their value as forage and grazing plants.

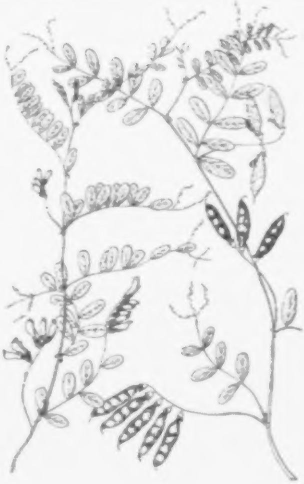
Notes: The generic Latin name alludes to the 3-divided leaves; clovers have long been used as human food, the entire plant eaten as a salad green (cooked foliage apparently causes bloat), and tea and flour made from dried flowers and seeds; infusions and teas made from clover flowers have been used to cure a variety of ailments, from liver and gall bladder disorders to skin problems, constipation, bronchial and renal conditions and sore throats; more recently, the isoflavones in red clover have been identified as having estrogen-like properties, useful in treating menopausal symptoms; clovers are valued as bee pasture, although the long flower tube of *T. pratense* is only accessible to bumble bees and some butterfly species; clovers have been seeded extensively for reclamation and range improvement projects, known to be somewhat more acid tolerant than alfalfa (*T. hybridum* our most acid and alkaline tolerant clover), but will not survive in highly alkaline or acidic soils.

VICIA L. - Vetch

Common Characteristics

- Annuals or perennials (ours), often from creeping rhizomes.
- Stems slender, lax, angled, climbing.
- Leaves pinnate, the terminal leaflets modified as tendrils.
- Style very slender, bearded with a tuft of hairs at or near the tip.
- Pods flat, elongate, 2-several-seeded.

Vicia americana Muhl. var. ***americana*** - American Vetch



Growth Habit: **Creeping** perennials, stems ridged and **angled**, mostly hairless, **lax and climbing**, up to 8 dm. long.

Blades: Leaves pinnate, leaflets **relatively thin**, 8-12, oval-oblong, the top rounded and short-pointed, 1-3 cm. long; **veins conspicuous, positioned at about a 45° angle from midrib**; stipules leaf-like, relatively small, lacerate; **tendrils branched**.

Inflorescence: Racemes **lax**, not 1-sided, surpassed by leaves, **(3) 4-9-flowered**; flowers **blue-purple, 12-20 mm. long**; pods flat, elongate, 2-several-seeded, hairless.

Related Species:

1. Var. ***sparsifolia*** Nutt. - Narrow-leaved Vetch
More common in open prairie grassland.
Differs as follows:
    - Stems more often (but not always) more densely hairy with short curved hairs.
    - Blades narrowly oblong-linear, the lateral veins positioned at a very narrow angle to the midrib.
    - Leaflets thicker, firm.
    - Flowers usually slightly larger, 18-22 mm. long.
    - Racemes fewer (3-6)-flowered.

Habitat & Distribution:

Common throughout most regions. Found in open woods and thickets, fescue grassland; in drier regions restricted to ravines, coulees, woodlands, snow melt areas.

Forage Value:

Good, with high nutritional levels, protein content averaging 20% in the summer, and crude fiber low; American vetch is palatable to livestock throughout the season, particularly so to sheep.

Grazing Response:

A decreaser, disappearing from abused rangeland both because of high palatability and poor resistance to close grazing and trampling.

Notes:

Vicia, the classical name for the plant, the specific and common names probably a reference to the species' N. American distribution; some *Vicia* species are apparently toxic to both livestock and humans (seeds usually suspected), but there is no evidence to support such claims as far as American vetch is concerned; both var. *americana* and var. *sparsifolia* are natural early successional species, readily colonizing disturbances in rangeland; characteristic of other members of its family vetch has good nitrogen-fixing ability, and the rhizomatous growth habit is effective in soil stabilization and erosion control; preliminary trials show fairly good establishment, although seed requires scarification, var. *americana* recommended for moister and wooded regions of the province, var. *sparsifolia* much more adapted to open prairie grassland and drier sites in foothills and parkland regions.

GERANIACEAE - Geranium Family

Common Characteristics

- Herbaceous plants often with geranium odor.
- Leaves pinnately or palmately divided, with stipules.
- Flowers hypogynous, perfect, regular, in umbels or cymes.
- Petals separate, flower parts in 5's.
- Stamens 5 or 10.
- Styles united into a column, carpels 5, each with one of the two ovules maturing.
- Capsules beaked, splitting upward from base into 5 segments.

GERANIUM L. - Geranium; Crane's-bill

Common Characteristics

- Annuals, biennials or perennials from taproots, often swollen at the nodes.
- Leaves palmately lobed or divided.
- Flowers in cymes, often showy.
- Stamens 10.
- Capsules often explosive, with styles recoiled (not spirally twisted) and hairless.
- Capsules long-beaked, splitting into 5 segments, each with tail, 1-seeded.

Key to Geranium

1. Annuals/biennials; slender plants 2-6 dm. tall; petals 5-7 mm. long. *G. bicknellii*

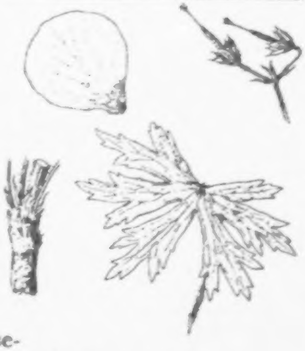
Perennials; robust plants to 9 dm. tall; petals 14-20 mm. long **2**

2. Blades with obscure fine pubescence, at least above, not glandular; petals white,hairy on the inner basal 1/2; capsules hairy, not glandular. *G. richardsonii*

Blades with coarse white hairs above and below, glandular; petals purple, hairy on the inner basal 1/4; capsules glandular-hairy. *G. viscosissimum*

Geranium viscosissimum Fishch. & Mey. - Sticky Purple Geranium

Growth Habit: **Perennials** from a **thick woody taproot** and a woody, heavy, mostly compact caudex; stems 2.5-9 dm. tall, erect, spreading coarse-hairy below (and on stalks) and often glandular, similar above but also densely glandular-long soft-hairy; **stems not hollow; plants with geranium odor**.

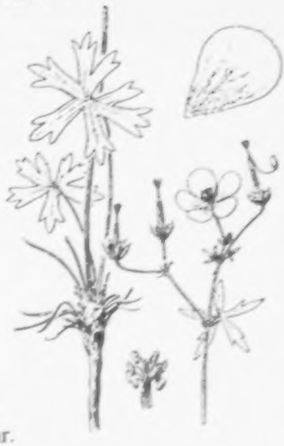


Blades: Blades 5-12 cm. across, 5-7 parted and again sharply incised, the basal blades long-stalked; leaves **white-coarse-hairy and glandular above and below**, most hairs below confined to the veins; stipules hairy, brownish, membranous.

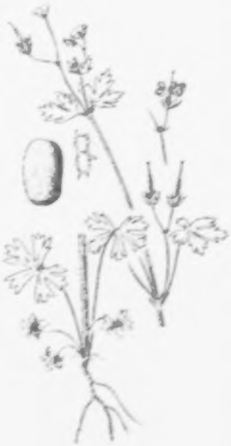
Inflorescence: Cymes rather contracted, few-several-flowered, the flowers **usually overtopping the leaves**, the flower stalks 2-6 cm. long, **densely glandular-long-hairy** (glands usually not purple); sepals 8-12 mm. long, **glandular-long-hairy**, green and pale margined, often suffused with purple, with blunt bristle tips; petals 14-20 mm. long, **purple, long soft-hairy inside, mostly on basal 1/4**; capsules **glandular-hairy, splitting from the base into 5 parts**.

Similar Species:

1. ***Geranium richardsonii*** Fisch. & Trautv. - Wild White Geranium
   Frequent in the foothills, montane and boreal forest regions, occasional in the parkland ecoregion. Grows in moist woods, thickets and clearings, in moist fescue grassland.
   Differs as follows:
   - Blades with less hairiness, often finely hairy, at least above, not glandular.
   - Flowers usually overtopped by upper leaves.
   - Flowers white, hairy on the inner basal 1/2.
   - Capsules hairy but not glandular.



2. ***Geranium bicknellii*** Britt. - Geranium
   A weedy native, found in clearings, burned sites, on disturbances in woodlands. Common except in the prairie region.
   Distinguished as follows:
   - Annuals/biennials 2-6 dm. tall.
   - Plants slender, freely branched.
   - Leaves deeply 5-parted, the divisions cleft into narrowly oblong lobes.
   - Leaves 5-7 cm. wide.
   - Peduncles with 2 flowers, pedicels longer than the calyx, glandular.
   - Sepals broadly ovate-oblong, awn-tipped, hairy on veins and margins.
   - Petals 5-7 mm. long, pink-purple.
   - Fruit about 2 cm. long, with a beak 3-5 mm. long.



Hybrid Species:

Intermediate species occur, having characteristics of both *G. richardsonii* and *G. viscosissimum* (i.e. lavender petals hairy on inner 1/2, plants somewhat but not densely glandular). These are believed to be hybrids between the two species.

Habitat & Distribution:

Common in southern foothills and montane regions, with a few occurrences in the southern prairie and parkland areas. Found in open woods, fescue grassland, on moist slopes and coulees, in openings in willow thickets. Associated with rich, mesic sites.

Forage Value: Good, both *G. viscosissimum* and *G. richardsonii* nutritious and palatable early in the season, flowers and young shoots also readily eaten; by fall, old growth becomes coarse, (although still eaten by sheep) and dries up after first frosts; value as a range species is due, in part, to the rather large amounts of forage produced. *Note:* Native geraniums are frequently confused with delphinium in the vegetative growth stages, hence have erroneously been considered toxic; geranium odor and solid stems should adequately separate them from delphinium species.

Grazing Response: A decreaser, the thick heavy roots capable of holding significant food reserves and withstanding moderate grazing, but populations nevertheless declining in over-utilized pastures.

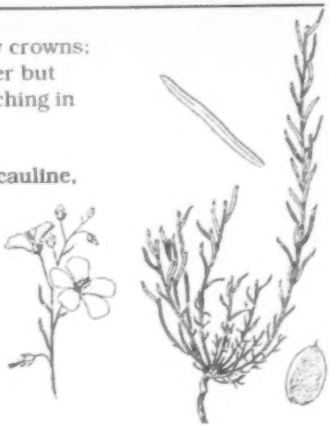
Notes: Both the family and generic name originate from the Greek *geranos*, a crane, referring to the resemblance of the beaked seeds of many species to a crane's bill; the specific *viscosissimum* appropriately refers to the sticky hairs on plants; known for its astringent and styptic properties, sticky purple geranium was widely used by aboriginal people, taken internally for digestive problems and hemorrhages, poultices used to relieve pain and inflammation, and as an astringent for cosmetic purposes; the powdered root was used, especially by Blackfoot Indians, for first aid and to stop bleeding; both the white and purple species are important range plants, hence are recommended in reclamation mixes, *G. richardsonii* more adapted to wooded and moister regions, *G. viscosissimum* best suited to *F. campestris* grasslands; plants are relatively easy to establish from seed, but commercial quantities of seed are not yet available; *G. bicknellii* is of special interest as an early successional, short-lived native that naturally colonizes various disturbances throughout forested regions.

LINACEAE - Flax Family
LINUM L. - Flax

Key to Linum

1.	Branched-angled annuals 1-5 dm. tall; sepals with glandular margins; petals yellow.	*L. rigidum*
	Robust less angled perennials 2-7 dm. tall; sepals without glands; petals blue.	*L. lewisii*

Linum lewisii Pursh - Wild Blue Flax



Growth Habit: **Perennials** from taproots and woody crowns; stems green, ridged, hairless, slender but erect, usually several together, branching in inflorescence, **2-7 dm. tall.**

Blades: Leaves **numerous and overlapping, cauline, linear and 1-nerved.** 1-2 cm. long, **hairless, the top pointed to blunt**, ascending.

Inflorescence: Plants few-flowered, the stalks 1-2 cm. long, recurved; sepals 4-7 mm. long, **long-pointed to blunt**, with **entire, pale margins, without glands; flowers blue, the petals 10-20 mm. long**, early deciduous; stigmas head-like; styles not united; capsules **subspherical, longer than sepals.**

Similar Species:

1. ***Linum rigidum*** Pursh - Yellow Flax
   Common in the prairies, occasional in parkland and southern foothills regions, found in drier locations: in dry prairie grassland, and especially on exposed hillsides and slopes.
   Differs as follows:
   - Plants annual, from slender taproots, smaller, 1-5 dm. tall, the stems and branches more angled.
   - Leaves more early deciduous.
   - Sepals lanceolate, pointed to awn-pointed, the margins glandular.
   - Petals yellow.
   - Styles united to near top.
   - Capsules more ovoid, shorter than to nearly equalling sepals.

Habitat & Distribution: Most common in foothills, montane and parkland regions, occasional elsewhere. Grows in open places: in fescue and prairie grassland (absent from driest sites), on subxeric slopes and ridges in montane areas.

Forage Value: Poor, both blue and yellow flax providing very little forage, and considered unpalatable except early in the season and when better quality forage is scarce; although apparently containing small amounts of cyanide, it is doubtful that our species have been responsible for livestock poisoning.

Grazing Response: Increasers, the plants usually left ungrazed to produce seed (this in considerable quantities); as well, *L. rigidum* often occupies habitats infrequently utilized by livestock.

Notes: From the Greek, *Linon*, a thread, members of the genus producing strong thread, used since Biblical times as a source of linen; *L. lewisii* was well known to native people for this purpose, from which ropes, cords, baskets, mats, fishing nets, etc. were made; the seed, although commonly known as a source of linseed oil, also has long been used for medicinal purposes, both applied as a poultice for sores and burns, and taken internally to lower cholesterol, improve the immune system and relieve cold and cough symptoms; native flaxes have some ornamental value, (although petals are rather readily shed), and are attractive additions to wild flower mixes in reclamation work; the abundance of seed produced is relatively easy to handle, and plants can be grown easily from seed.

EUPHORBIACEAE - Spurge Family
EUPHORBIA L. - Spurge

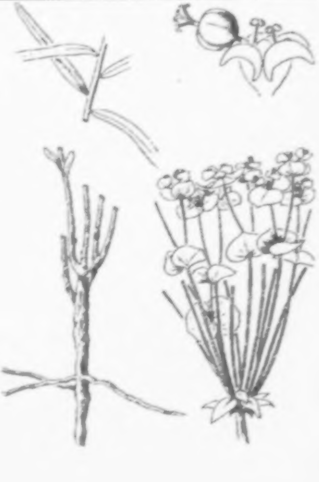
Common Characteristics

- Annual to perennial herbs with milky juice.
- Blades alternate, opposite or whorled.
- Flowers borne in short compact involucrate clusters, each cluster resembling a single flower.
- Flowers small, each cup-like involucre with 1 pistillate flower and several staminate flowers, perianth lacking.
- Involucre perianth-like.
- Fruit a 3-lobed, 3-seeded capsule, usually reflexed, separating into 3 segments.

Euphorbia esula L. - Leafy Spurge

Growth Habit: Perennial herbs from **deep** (to 1 m.) **extensive rhizomes**; stems 4-9 dm. tall, erect, freely branched above, firm, glaucous, hairless or sparsely hairy above; **juice milky**.

Blades: Lowest blades scale-like, the mid cauline **lanceolate-oblong to linear, entire**, stalkless, **2-7 cm. long, alternate except becoming whorled at the base of the flowering umbel**; blades hairless, somewhat glaucous; stipules absent.



Inflorescence: Umbel rays 7-12, terminating stems, with **large, opposite ovate-kidney-shaped floral leaves (bracts)** about 1 cm. long, **yellow-green**; involucre **2-3 mm. high, yellow-green**, with 4 crescent-shaped or horned glands; **capsules about 4 mm. wide, finely warty-granular**; seeds spherical-ovoid, about 2 mm. long, yellow-brown, smooth, with a small bump near the base.

Habitat & Distribution: A common introduced weed, found in waste places, in fields, in sandy and gravelly soils, on river flats.

Forage Value: Poor, plants unpalatable due to the acrid milky sap; although rarely eaten, leafy spurge has been known to cause some problems in livestock, symptoms including irritation of the mouth and gastrointestinal tract (other species, supposedly containing cyanide, causing photosensitivity).

Grazing Response: An invader, European, and one of our most troublesome weeds; the deep, extensive rhizomes store an abundance of food reserves, making the species difficult to eradicate by cultivation; large infestations have established in rangeland in drier regions, in areas with marginal soils, and on sandy and gravelly river flats.

Notes: Named for Euphorbus, a physician to King Juba II of Mauretania; primarily species of tropical and subtropical regions, many spurges are well known; the milky juice of one species was used as arrow-poison by Ethiopian warriors; the best known member of the genus, *E. pulcherrima*, is our familiar "Pointsettia"; *E. esula* is considered mildly toxic to humans, even honey from the species is suspect; although not desirable for revegetation work for its obvious invasive nature, close relatives of leafy spurge (probably also aggressive) have been recently planted as ornamentals in southern Alberta.

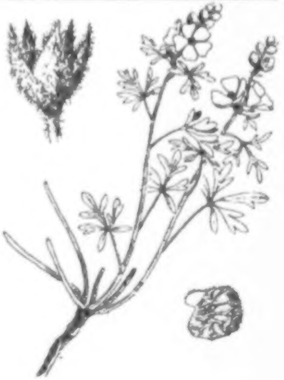
MALVACEAE - Mallow Family

Common Characteristics

- Herbs with leaves alternate, these palmately lobed.
- Hairs often star-shaped.
- Flowers regular and perfect.
- Calyx 5-lobed, often with alternating bracts.
- Petals 5, united at the base and joined to the stamen tube.
- Stamens numerous, forming an elongate tube that surrounds the style.
- Carpels united in a ring around a central axis and at the base of the style.
- Fruit a capsule splitting into several parts.

SPHAERALCEA St. Hil. - Globe Mallow

Sphaeralcea coccinea (Pursh) Rydb. - Scarlet Mallow



Growth Habit:	**Low growing plant from extensive rhizomes, often mat forming**; stems reclining to ascending, somewhat woody-based, 1-2 (3) dm. long, **pale grey-green with star-shaped hairs**.
Blades:	Leaves 2-5 cm. long, **3-divided, the divisions again lobed, wedge-shaped at the base**; blades **with star-shaped hairs, yellow-green above, yellow to grey-green below**; stipules early deciduous.
Inflorescence:	Flowers in short terminal racemes, the lower bracts leaf-like, the upper smaller; calyx lobes 3-5 mm. long, **they and bracts star-shaped-hairy**; corolla saucer-shaped, **of 5 orange-red petals 1-1.5 cm. long**; fruit of 10 or more carpels, these **densely star-shaped-hairy** on the back; carpels becoming 1-seeded segments at maturity.
Habitat & Distribution:	Common in the prairie and parkland regions, occasional in the southern foothills. Found in open grassland, usually a component of prairie rangelands. Also grows on disturbed areas: along roadsides and on other mechanical disturbances, around gopher holes.
Forage Value:	Poor, unpalatable and essentially worthless as a range species.
Grazing Response:	An increaser; low, rhizomatous growth habit, poor palatability and its ability to survive in poor soils and dry sites contribute to the species' success as a competitor.
Notes:	Syn. *Malvastrum coccineum*; *Sphaeralcea*, from the Greek *shaera*, sphere, and *alcea*, mallow, alluding to the spherical fruit, the specific and common names appropriately referring to the bright, scarlet-colored flowers; a natural pioneer on disturbances, scarlet mallow can be regarded as an excellent early successional reclamation species; furthermore, it has as an exceptionally wide range of adaptations, especially valued for its tolerance of droughty conditions and poor soils.

VIOLACEAE - Violet Family

Common Characteristics

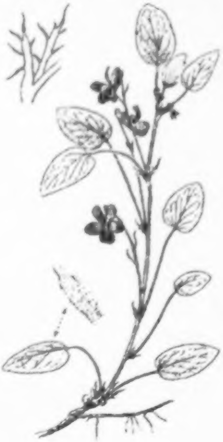
- Low growing plants, mostly perennials and mostly rhizomatous.
- Plants either stemless or with distinct nodes.
- Blades basal or alternate.
- Flowers solitary, stalked, irregular, perfect.
- Flowers of two kinds: early spring flowers showy, later ones with small or no corolla, enclosed and fertilized within the calyx (cleistogamous).
- Sepals 5.
- Petals 5, the lowest spurred or sac-like at the base, the two lateral often bearded inside.
- Fruit a capsule, opening (usually explosively) by 3 valves ejecting numerous seeds.

VIOLA L. - Violet

Key to Viola

1.	Plants without evident stems.	2
	Plants with leafy stems.	4
2.	Plants with stolons; leaves glabrous on both surfaces; petals violet; bog species.	*V. palustris*
	Stolons lacking (but may have rhizomes).	3
3.	Flowers violet; leaves mostly glabrous; bog plants.	*V. nephrophylla*
	Flowers white and purple-veined; upper leaf surface hairy to glabrous; plants of moist woods.	*V. renifolia*
4.	Flowers blue-violet or whitish.	5
	Flowers yellow.	6
5.	Stipules not toothed; flowers white or purple-tinged; woodland plants.	*V. canadensis*
	Stipules toothed; flowers violet; plants of grassland/open woods.	*V. adunca*
6.	Leaves ovate-lanceolate, mostly entire; prairie species.	*V. nuttallii*
	Leaves broad-rounded (reniform), toothed; mountain species.	*V. glabella*

Viola adunca J.E. Smith - Early Blue Violet



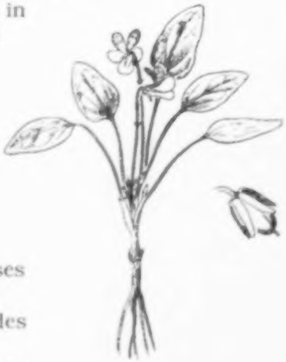
Growth Habit: Perennials **from short, slender rhizomes**; stems tufted, erect-ascending, to 15 cm. tall, **with distinct nodes**, hairless to sparsely hairy.

Blades: Leaves **ovate-rotund**, more or less **cordate-based**, shallow-toothed, on long stalks and sometimes surpassing flowers; leaves from hairless to short hairy on both surfaces; stipules 3-8 mm. long, linear-lanceolate, **mostly toothed**.

Inflorescence: Flowers **showy, blue-violet, 5-15 mm. long**, the spur over 1/2 the length of lowest petal, often hooked, lowest petal **sometimes white and purple-lined at base**, the 2 lateral ones **white-bearded**; style head bearded; **fruit a 3-valved capsule** to 5 mm. long.

Similar Species:

1. ***Viola nuttallii*** Pursh - Yellow Prairie Violet
   Common in the prairies, occasional in the southern foothills and parkland regions. Found in dry prairie grassland, on exposed slopes and dry hillsides at higher elevations.
   Differs as follows:
   - Stems present, but sometimes attached below soil surface.
   - Blades ovate-lanceolate, the bases tapering to somewhat heart-shaped; hairiness variable, blades mostly not toothed.
   - Stipules with fewer teeth or entire.
   - Flowers yellow, the lower 3 petals purple-veined, the lateral 2 bearded, spur short.



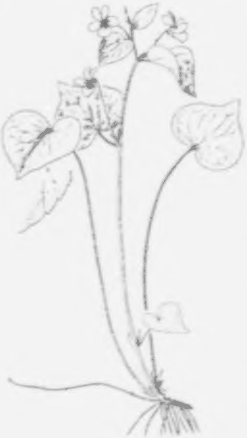
Habitat & Distribution: Frequent in most regions, absent from most of the prairies. Grows in fescue grassland, moist meadows, in open woods and thickets.

Forage Value: Poor; although nutritious, violets produce little forage, and this is often below normal grazing level.

Grazing Response: Increasers, both *V. adunca*, and *V. nuttallii* are very tolerant of grazing because of rhizomatous and low growth habit; early blue violet is an especially resilient species, often persisting in altered rangeland; violets are characterized by the special reproductive adaptation of producing two seed crops per season, and seeds are effectively dispersed by exploding capsules.

Notes: *Viola*, the old Latin name for the plants, *adunca*, meaning hooked, in reference to the spurred base of the lower petal; violets are edible, and are both flavorful and high in vitamin C; as well, they are renowned for their medicinal properties, believed to "clean the blood", and used to treat sore throats and coughing, asthma, skin disorders, also a mild laxative and sedative; native violets are of considerable value as ornamentals, the genus as whole adapted to a wide variety of habitats and moisture regimes.

Viola canadensis L. var. ***rugulosa*** (Greene) C.L. Hitchc. - Western Canada Violet



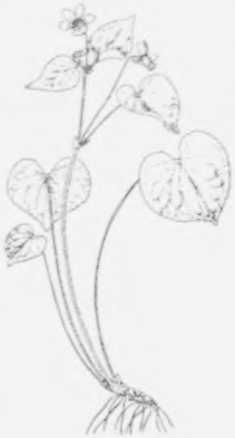
Growth Habit: Perennials with short thick rhizomes, also somewhat stoloniferous; **stems present, 1-4 dm. tall**, glabrous to pubescent.

Blades: Leaves **on long petioles, relatively large, to 8 cm; broad, ovate to reniform, cordate**, the apex **abruptly pointed, crenate, glabrous to short-hairy** (especially below), the surface somewhat **rugulose**; stipules 1-2 cm. long, membranous, **entire**.

Inflorescence: Flowers arising from upper axils, exceeded by leaves; sepals lanceolate, pubescent to only ciliate; petals **8-12 (15) mm. long, white and yellow-based**, the **lower 3 purple-veined**, lateral 2 bearded, all but 2 upper purple-tinged; spur short; style head with sparse long hairs; capsules finely pubescent to granular.

Similar Species:

1. ***Viola glabella*** Nutt. - Yellow Wood Violet
   Locally abundant in montane to subalpine forests in the southern Rocky Mountains. Vegetatively, resembling *V. canadensis*.
   Differs as follows:
   - Flowers yellow.
   - Foliage glabrous.



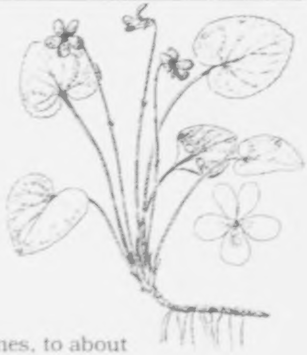
Habitat & Distribution: Common and widespread. Absent from the dry prairie region. Found in moist woods, willow thickets, and in moist meadows. Prefers fertile, loamy soils and is an indicator of these sites.

Forage Value: Fair, plants nutritious and fairly palatable, *V. canadensis* our most productive, and where best adapted, most abundant species.

Grazing Response: Increasers, the plants with rather aggressive rhizome growth, and although not considered troublesome, can form dense matted colonies when growing under ideal conditions; the clearing of willow thickets to increase carrying capacities will also result in reduced violet populations and the subsequent increase in the prominence of grasses.

Notes: Syn. *V. rugulosa*, describing the wrinkled leaf surface; as with other members of the family, western Canada violet is edible, also possesses medicinal properties (see notes: *V. adunca*); due to its tendency to spread vegetatively, *V. canadensis* is often a successful pioneer in moist shaded sites, also transplants readily provided habitat requirements are met.

Viola nephrophylla Greene - Bog Violet



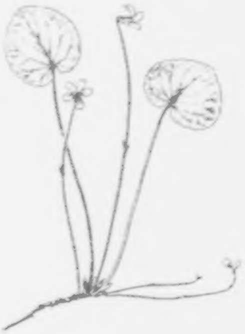
Growth Habit: Acaulescent plants from **stout, fleshy ascending rhizomes, stolons absent.**

Blades: Blades firm, **glabrous, ovate to reniform**, cordate-based, the apex obtuse to blunt-pointed, the margins crenate; **blades 3-5 cm. wide, to 7 cm. long**; petioles rather long; stipules somewhat toothed, **uniformly colored**.

Inflorescence: Peduncles arising directly from rhizomes, to about 30 mm. long, **flowers large, showy, 10-20 mm. long, the spur short, 2-3 mm. long; petals blue-violet**, the lower 3 whitish-based, bearded, the upper pair sometimes not bearded; capsules 8-10 mm. long, the **seeds olive brown**.

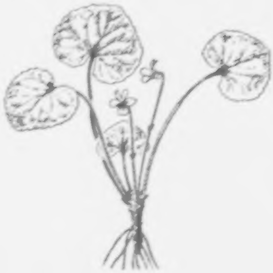
Similar Species:

1. ***Viola palustris*** L. - Marsh Violet
   Scattered throughout all ecoregions except the prairies. Grows in moist places: in swampy meadows and bogs, along streams, in fens and marshes.
   Differs as follows:
   - Plants rhizomatous, but also producing slender stolons.
   - Blades thinner and smaller (2.5-3.5 cm. broad, 2-5 cm. long).
   - Stipules scarious-greenish and red-striped.
   - Flowers smaller, 10-15 mm. long.
   - Petals paler, pale lilac to whitish and purple-veined.
   - Seeds dark brown.



2. ***Viola renifolia*** A. Gray - Kidney-leaved Violet

Frequent in all ecoregions except the prairies. Also in Cypress Hills. Prefers mesic-subhygric habitats, a component of climax coniferous forests.



Differs as follows:

- Stolons absent, rhizomes ascending.
- Blades reniform-orbicular, cordate, the apex round to blunt-pointed, 2-6 cm. long and broad.
- Blades pubescent below, glabrous to pubescent above.
- Petioles often shorter than leaves.
- Stipules lanceolate, glandular toothed.
- Petals all white and beardless, the lower often with purple veins.
- Capsules purplish.

Habitat & Distribution: Frequent in the foothills, montane and parkland regions, also in the northern boreal forest and in Cypress Hills. Found in moist boggy woods, along streams, in wet meadows.

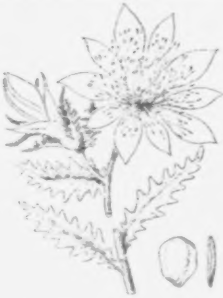
Forage Value: Poor; although nutritious and palatable, all three listed species are rarely abundant, and account for very little of the herbage produced on most rangelands.

Grazing Response: Increasers, but never intrusive, and because of high moisture requirements, do not occur on mesic (or drier) sites.

Notes: Violets are rather remarkably equipped to ensure pollination, the early phase flowers having nectaries extending backward into the spur and thus forcing visiting insects to probe deeply, and in doing so, come into contact with pollen; the bearded petals and styles of some species, in turn, collect the pollen as the insect visits the next flower; the late, cleistogamous flowers by-pass this process, instead remain closed, and are self-fertilizing.

LOASACEAE - Loasa Family
MENTZELIA L. - Sand Lily

Mentzelia decapetala (Sims) U. & G. - Sand Lily; Evening Star



Growth Habit: **Biennial** (short-lived perennials) **from stout taproots**; stems stout, erect, mostly solitary, simple below, branched above, **pale grey, 4-10 dm. tall, densely armed with scabrous, spine-like hairs**.

Blades: Leaves alternate, lower short-stalked, **oblong-lanceolate**, the upper somewhat reduced, lanceolate, sessile; **blades sharply pinnate-toothed, spiny-scabrous on both surfaces; blades 4-15 cm. long**.

Inflorescence: **Flowers large, showy, opening in the evening, pleasantly scented**, at the ends of branches; floral bracts (reduced leaves) joined to lower part of ovary; calyx rough-pubescent, 5-lobed; **petals 10, yellow-white, 4-8 cm. long**, about twice the length of sepals, the inner 5 (staminodia) narrower; stamens numerous, with filiform filaments; ovary inferior, 1-loculed, with ovules in 2 rows on each of 3 parietal placentae; style papillose on several spiral angles; **fruit an oblong capsule about 4 cm. long, with calyx persistent around it**; seeds many, dark grey-brown, strongly flattened and thin-margined.

Habitat & Distribution: Rather common but restricted to southern regions (rare N. of the Old Man River). Found on dry, eroded hillsides. Also in disturbed dry sandy and gravelly areas where often abundant.

Forage Value: Poor, unpalatable at all growth stages.

Grazing Response: An increaser.

Notes: Named in honor of C. Mentzel, an early German botanist; the term evening star alludes to the unique floral characteristics of opening only in the evening; this phenomenon has a probable cause in the activity of light sensitive enzymes within the flower that causes opening or closing, depending on light intensity; this, in combination with its pleasant fragrance, may very well be an adaptive strategy to attract nocturnal insect pollinators.

ONAGRACEAE - Evening Primrose Family

Common Characteristics

- Annual to perennial herbs with fibrous roots, taproots, or rhizomes.
- Leaves opposite or alternate, simple (ours), exstipulate or with small glandular stipules.
- Flowers mostly regular, perfect, in spikes or racemes.
- Sepals and petals each 2 or 4.
- Ovary inferior.
- Fruit a many-seeded capsule, or less often not opening and few seeded.

Key to Onagraceae

1. Flowers slightly irregular, white to dark pink; fruit nut-like, indehiscent. *Gaura*

Flowers regular; fruit a capsule, opening by valves; seeds numerous. 2

2. Seeds without tufts of hairs. *Oenothera*

Seeds with a tuft of hairs attached to the end. *Epilobium*

EPILOBIUM L. - Willow-herb

Common Characteristics

- Annuals or perennials, fibrous rooted or more often rhizomatous or stoloniferous, also sometimes producing turions (basal bulblike structures).
- Leaves variable: narrow to ovate, entire to toothed, stalkless to short-stalked, mostly opposite.
- Flowers in racemes or solitary in leaf axils.
- Petals and sepals each 4, the petals white, pink or purple (rarely yellow), notched or broadly rounded at top.
- Fruit an elongate 4-valved and 4-celled capsule.
- Seeds bearing a tuft of hairs at top.

Key to Epilobium

1. Small slender montane-alpine plants mostly less than 2 dm. tall, forming stolons but not turions; plants in tufts, often partly reclining. *E. anagallidifolium*

Plants more robust, or if small, forming turions, mostly erect. 2

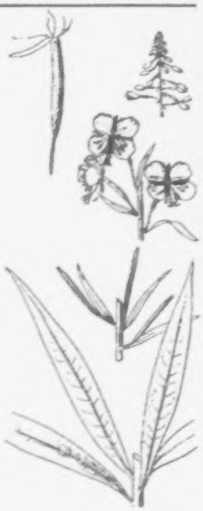
2. Leaves opposite or in whorls, at least below; flowers regular (radically symmetrical), small; hypanthium present. *E. ciliatum*

Leaves alternate; flowers bilaterally symmetrical (symmetrical along only one plane); petals over 1 cm. long; hypanthium absent. 3

3. Inflorescence elongate and not leafy, with numerous (15+) flowers; mature style longer than stamens; seeds to 1.3 mm. long. *E. angustifolium*

Inflorescence short and leafy, flowers 1-15; mature styles shorter than stamens; seeds more than 1.3 mm. long. *E. latifolium*

Epilobium angustifolium L. ssp. *angustifolium* L. - Fireweed



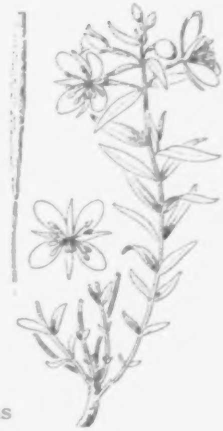
Growth Habit: Perennials **with wide-spreading rhizomes, forming large patches**; roots also forming buds; **stems 1-3 m. tall**, hairless except for fine hairs above, simple or branched above.

Blades: Leaves **alternate**, **numerous**, mostly cauline, nearly stalkless, **2.5-15 cm. long**, **lanceolate**, entire to slightly toothed, hairless; veins below distinct.

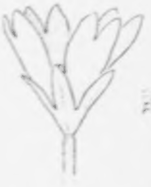
Inflorescence: Racemes **terminal, many-flowered, elongate**, with small bracts, **otherwise not leafy**; sepals 8-15 mm. long, narrowly lanceolate; petals **8-20 mm. long, showy, rose-purple** (rarely white); stigma 4-lobed; capsules **4-10 cm. long**, short grey-hairy; seeds 1-1.3 mm. long, **with an off-white tuft of hairs to 15 mm. long**.

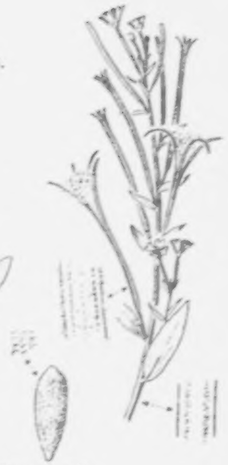
Similar Species:

1. ***Epilobium latifolium*** L. ssp. ***latifolium*** - Broad-leaved Willow-herb
   Restricted to the foothills and Rocky Mountain regions. Found from lowland to alpine elevations. Common along streams, on gravelly or sandy river bars, in ditches. At higher elevations, found on scree and talus slopes.
   Differs from *E. angustifolium* as follows:
   - Plants without rhizomes.
   - Lower growing but stout species, 0.5-7 dm. tall.
   - Foliage often glaucous.
   - Blades smaller, mostly less than 8 cm. long, and elliptic-lanceolate.
   - Blades thicker, almost fleshy, the veins below not distinct.
   - Inflorescence with leafy floral bracts.
   - Racemes short and fewer-flowered (1-15).
   - Styles shorter than stamens, glabrous.
   - Seeds larger (1.3-2.4 mm. long).

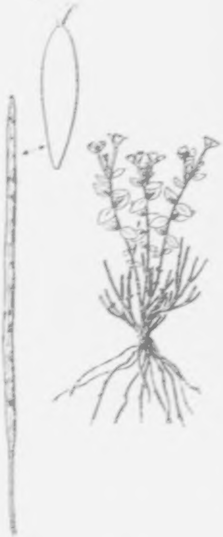


2. ***Epilobium ciliatum*** Raf. -
Northern Willow-herb
Common in all regions except the prairies. Grows in swampy and boggy places, in moist woods and springy places.
Distinguishing features:
- More slender plants with rhizomes, and forming basal turions (bulbs).
- Stems 0.5-10 dm. tall, with hairs in vertical lines.
- Blades ovate-lanceolate, often toothed.
- Petals pink, notched, 2-10 mm. long.
- Capsules slender, 4-10 cm. long.





3. ***Epilobium anagallidifolium*** Lam. - Willow-herb
One of several small slender willow-herbs, some of these difficult to identify (mature seeds with microscopic differences required).
Common on moist montane to alpine slopes. Syn. *E. alpinum*.
Distinguished as follows:
- Small mat forming perennials 3-20 cm. tall, often reclining-ascending, roots rather short.
- Stems with hairs in vertical lines.
- Inflorescence often mostly glabrous, nodding when immature.
- Basal blades oblong, the upper lanceolate, often toothed, 0.9-2.5 cm. long.
- Blades glabrous to sparsely hairy above.
- Petals 2.5-7 mm. long, pink to pale pink.
- Seeds to 1.4 mm. long, reticulate, coma not easily deciduous.



Habitat & Distribution:

Common in all regions except in the prairies. Found in woodlands, willow thickets, in open woods and clearings, on lush montane slopes. Known to be especially common in burned areas, also on other disturbed sites (roadsides, recent clearings), and will persist in many mature forests as an understory species.

Forage Value: Fair, although the species ranges from poor to good from one region to the next, and palatability varies, being poorer for horses, utilized to some extent by game and cattle, most frequently by sheep; young plants are consumed in their entirety, but as stems become woody, only leaves and flowers are eaten; fireweed is listed as one of our more important range forbs, producing nutritious and palatable forage from early spring until fall.

Grazing Response: An increaser #1, population status varying somewhat depending upon utilization; when grazed sparingly, fireweed is an aggressive species due to vigorous rhizome growth, and is a well known fire hazard when old growth accumulates; when excessive amounts of litter accumulate over time fireweed will sometimes establish strong populations in the decaying organic matter; this most commonly occurs in the absence of grazing, also on highly productive non-native sites; however, continued heavy use stimulates tiller growth (these tillers normally remain dormant for the following season), increasing forage production, but reducing viability and ultimately shortening the life of the stand.

Notes: From the Greek *epi*, upon, and *lobos*, pod, in reference to the inferior ovary, *angustifolium* meaning narrow-leaved; the common name fireweed is appropriate, the species a frequent pioneer on burned-over areas; also known as willow-herb because both leaves and the silky seeds resemble those of willows; *E. angustifolium* is tasty and nutritious (containing high amounts of beta carotene and vitamin C), young shoots often cooked, also eaten as a salad green; as well, native people took decoctions as intestinal astringents, and made poultices to heal burns and various skin sores; although valued as an early successional reclamation species; fireweed is difficult to propagate by seed and as yet little seed has been available on the commercial market.

OENOTHERA L. - Evening Primrose

Common Characteristics

- Annual, biennial or perennial herbs, sometimes woody-based, with slender to heavy taproots.
- Leaves basal or alternate, mostly simple.
- Petals often large and showy, 4, yellow to white, pink or red, often nocturnal.
- Sepals 4, reflexed during flowering.
- Stamens 8, anthers attached near the middle (versatile).
- Capsules 4-valved, straight to curved, with numerous seeds without hair tufts.

Key to Oenothera

1. Plants with leaves in rosettes, without leafy stems. *O. caespitosa*

   Plants (mature) without distinct rosettes, stems leafy. 2

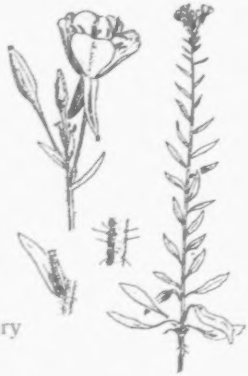
2. Plants somewhat shrubby; flowers yellow. *O. serrulata*

   Plants herbaceous. 3

3. Stems white and shredded; flowers white to pink-tinged; species of sandy habitats. *O. nuttallii*

   Stems red-green, not distinctly shredded; flowers yellow; habitat variable. *O. biennis*

Oenothera biennis L. - Yellow Evening Primrose



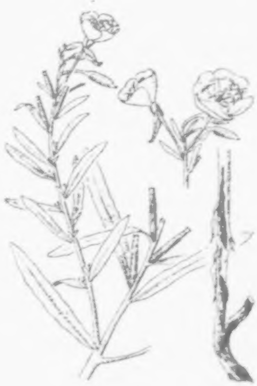
Growth Habit: **Biennial** (short lived perennial) **from a thick taproot**; stems produced in the second year, **5-15 dm. tall**, often branched, pale green and often purplish-tinged, **with both long and short hairs (these frequently red-blister-like at the base)**.

Blades: First year plants with rather **flat, conspicuous basal rosettes**; cauline leaves **numerous, lanceolate-oblong**, to 15 cm. long, nearly stalkless (or lower short stalked), **entire to wavy-slightly toothed**, hairy on both surfaces.

Inflorescence: Flowers in terminal spikes, with leafy bracts; buds erect, nocturnally opening; flower parts in 4's, sepals 10-15 mm. long, **at length reflexed**; inflorescence somewhat **sticky-hairy**; petals **yellow, showy, 12-25 mm. long**; capsules erect, 2-5 cm. long, narrow, hairy, 4-valved; seeds **without hair tufts**.

Similar Species:

1. ***Oenothera nuttallii*** Sweet - White Evening Primrose
   Occasional in southern regions, absent from montane areas. Grows in light often sandy soil, often on roadsides and other disturbances. Differs as follows:
   - Stems with white-shredding "bark", finely glandular-hairy above.
   - Leaves narrower (linear-lanceolate), mostly entire.
   - Sepals purplish, to 2.5 cm. long.
   - Buds nodding.
   - Flowers white, fading to pink.

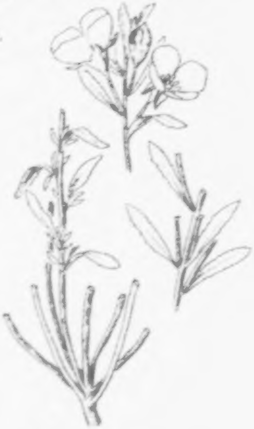


2. ***Oenothera serrulata*** Nutt. - Shrubby Evening Primrose

Occasional, rather widespread in the prairie and southern parkland regions. Found in dry prairie grassland, in sandy places, in dunes.

Distinguished as follows:

- Branched perennials, 1-5 dm. tall, plant bases somewhat woody.
- Blades oblong-spatulate to broadly linear, often toothed, hairy.
- Flowers sessile in upper axils, 10-25 mm. across.
- Petals bright yellow, wavy-toothed.
- Stigmas only shallowly 4-lobed.



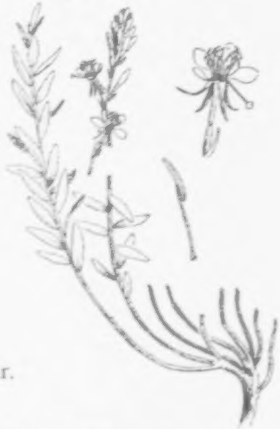
Other Species:

1. ***Gaura coccinea*** Pursh - Scarlet Butterfly-weed

Frequent in prairie and parkland regions, occasional in the southern foothills ecoregion. Grows in dry prairie grassland, on open hillsides, often on disturbances.

Distinguishing features:

- Taprooted perennials 1-5 dm. tall.
- Foliage rather uniformly and finely grey-hairy.
- Blades alternate, numerous, narrowly oblong-lanceolate, wavy-margined.
- Petals showy, somewhat irregular, orange-red, 4-7 mm. long.
- Sepals bent backward.
- Fruit obovate, angled, 1-seeded and not splitting open at maturity (unlike other members of the family).



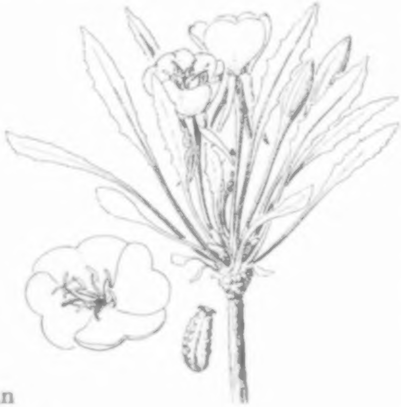
Habitat & Distribution: Frequent in southern regions. Occasional in the boreal forest, one disjunct population in the northern boreal region. Found in open, dry places and often in waste or disturbed areas such as along irrigation canals, in ditches, around well sites.

Forage Value: Poor, members of the genus seldom grazed and of little worth as range species.

Grazing Response: Increasers.

Notes: The generic name is the Greek term used by Theophrastus, originating from *oinos*, wine and *thera*, catching, the roots of some species taken after meals as an incentive to wine drinking, *biennis*, a reference to the characteristic biennial growth habit; roots were traditionally cooked and eaten, and the species also valued for a number of medicinal purposes, crushed leaves and seeds applied to wounds, and decoctions used to treat stomach disorders, asthma, and whooping cough; seed oils are still used today for a variety of ailments including: psoriasis, PMS, heart disease, and a number of malfunctions related to fatty acid problems; all of our evening primrose species make attractive ornamentals, some also with reclamation potential; *O. biennis* frequently pioneers waste and disturbed sites, where it is somewhat weedy in nature, but does not out-compete perennials once they establish; *O. nuttallii*, although seldom as abundant, thrives in disturbed and sparsely vegetated sandy areas where it functions to stabilize loose sandy soil.

Oenothera caespitosa Nutt. - Butte Primrose; Rock Rose



Growth Habit:	Perennials **from thick, woody taproots; plants essentially acaulescent**, to 2.5 dm. tall.
Blades:	**Leaves clustered at the base, 1-2 dm. long, narrowly to broadly oblanceolate**, on slender petioles, mostly sharply toothed, glabrous, or pubescent along the margins.
Inflorescence:	Flowers several, **showy, pleasantly scented, opening in the evening**; hypanthium slender, somewhat flared above, 3-10 cm. long, greenish to reddish; calyx lobes 2.5-3.5 cm. long, joined to free; **petals 2-4 cm. long, white, turning pink with age**; stigma with lobes 5-8 mm. long; capsules about 2.5 cm. long, not winged but with 4 wavy-crested angles, often tuberculate, sessile to stalked.
Habitat & Distribution:	Restricted to the prairie region in the south (north to Old Man River). Found on talus slopes, clay roadcuts and banks, on dry, often eroded slopes.
Forage Value:	Poor, unpalatable and of little importance as a range species.
Grazing Response:	Increasers on exposed, dry sites, the tough root system enabling the plants to recover from trampling and persist in dry, overgrazed conditions.

Notes: The specific name, a reference to the tufted growth habit, the common names alluding to various other families to which the flowers bear a superficial resemblance; a showy species, of considerable worth in dry, sunny gardens, also valued for erosion control in its natural habitat where vegetation cover is often naturally rather sparse.

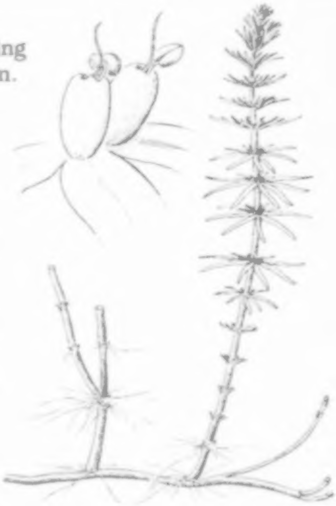
HIPPURIDACEAE - Mare's-tail Family

HIPPURIS L. - Mare's-tail

Common Characteristics

- Rhizomatous perennials, either aquatic or amphibious.
- Glabrous plants, the leaves in whorls, linear, sessile, entire, acute, 1-5 cm. long.
- Flowers green, sessile, 1 in each of the upper leaf axils.
- Flowers perfect or imperfect.
- Ovary surrounded by calyx, this barely lobed; petals lacking.
- Stamen 1, with a large 2-loculed anther and short filament.
- Ovary 1-loculed, 1-ovuled, inferior.
- Style stigmatic along one entire side, positioned between anther lobes in perfect flowers.
- Fruit nut-like, indehiscent, 1-celled, producing 1 seed.

Hippuris vulgaris L. - Mare's-tail



Growth Habit: **Perennial from extensive creeping rhizomes**; stems unbranched, **arising from rhizomes**, 5-30 cm. tall, **1 mm. thick or more**.

Blades: **Leaves 6-12 per whorl, 1-5 cm. long, entire, linear, 1-2 mm. thick**.

Inflorescence: Flowers **mostly perfect**, filaments and anthers each about 1 mm. long; mature ovaries about 1 (2) mm. long; **flowers 1 per axil in upper leaves, petals lacking**, calyx barely lobed; fruit 1-seeded, nut-like.

Habitat & Distribution: Common throughout most regions. Plants emersed for at least part of the season. Found in lakes, along streams, in sloughs, rooted on muddy shores.

Forage Value: Poor, essentially worthless as a range species.

Grazing Response: An increaser, although as with many aquatics, often not directly impacted by grazing intensities.

Notes: A small family, comprised of 2 or 3 species in the temperate zones; from the Greek *hippose*, horse, and *oura*, tail, this and the common name because of the appearance of the leaves; probably one of our most familiar aquatics, more readily observed than various submersed and floating species that are often obscure and also problematic taxonomically.

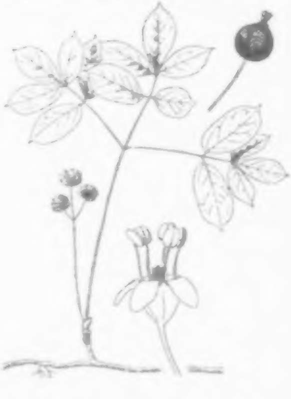
ARALIACEAE - Ginseng Family

Common Characteristics

- Herbaceous or woody perennials, sometimes rhizomatous.
- Leaves simple or compound, alternate (ours).
- Inflorescence umbel-like.
- Flowers small, greenish, regular, perfect or imperfect.
- Calyx lobes, petals, stamens and styles each 5.
- Fruit berry-like.

ARALIA L. - Wild Sarsaparilla

Aralia nudicaulis L. - Wild Sarsaparilla



Growth Habit: Herbs **with long creeping, woody rhizomes; essentially stemless**, with short subterranean woody stems; plants (leaves) **3-6 dm. tall**.

Blades: **Blades** (plus a flower stalk) **arising singly from rhizomes**, the stalk about equal in length to the blade, nearly hairless, subtended at the base by a brownish membranous scale; **leaves ternate and again pinnate, 3-5 divided**; leaflets **5-12 cm. long, ovate-oblong, toothed**, green and hairless above, paler and finely hairy on veins below.

Inflorescence: Flower stalks **considerably shorter than leaves, with 3-7** (usually) **spherical umbels**; flowers **white to green**, the petals **about 2.5 mm. long**; fruit **dark purple, globular, 6-8 mm. across, fleshy**, with flattened seeds.

Habitat & Distribution: Frequent in the parkland and boreal forest, occasional in the montane and foothills region. Found in shaded areas: in moist woods, clearings, wooded ravines and coulees, in rich, moist thickets. An indicator in many areas of mixed/deciduous forests with favorable moisture and nutrient status.

Forage Value:	Poor; although little information is available, wild sarsaparilla is generally considered to be of little significance as a range plant.
Grazing Response:	An increaser.
Notes:	From the French Canadian word *aralie*, the name used by an 18th century physician who sent specimens of the species to France to Tournefort who first used the current term *Aralia*; *nudicaulis*, a reference to the naked flower stalks; a member of the Ginseng Family. *A. nudicaulis* has been used as a substitute for the true sarsaparilla, a tropical species, the roots used to produce teas and cold beverages; *A. nudicaulis* was also valued for its medicinal properties by native N. Americans, roots used as tonics, stimulants (particularly useful to give energy for long hunting and war excursions), diuretics, demulcents, and to treat scurvy.

UMBELLIFERAE - Carrot Family

Common Characteristics

- Annual or perennial herbs, often aromatic and often with hollow stems.
- Leaves with stalk bases swollen or conspicuously sheathing.
- Leaves basal or alternate, usually compound, occasionally simple.
- Inflorescence umbellate.
- Flowers mostly regular and perfect, calyx of 5 (but often small to obsolete) teeth, petals 5.
- Stamens 5, inserted on disc on the ovary.
- Fruit dry, a capsule splitting into two halves.

Key to Umbelliferae

1. Leaves palmate, with 5-7 leaflets; fruit with hooked spines. *Sanicula*

Leaves not palmate; fruit without spines. 2

2. Lowest leaves simple, cordate. *Zizia*

Lowest leaves compound. 3

3. Primary leaves trifoliate, with divisions palmate, large, to 30 cm. broad. *Heracleum*

Leaves not as above. 4

4. Fruit linear-club-shaped, usually bristly. *Osmorhiza*

Fruit oblong-elliptical, no more than 3 times as long as broad. 5

5. Leaves once pinnate. 6

Leaves several times pinnate. 7

6. Leaflets serrate; plants of wet habitats. *Sium*

Leaflets entire and very narrow; plants of moist meadows. *Perideridia*

7. Larger plants at least 3 dm. tall. 8

Small plants less than 3 dm. tall. 11

8. Fruit flattened parallel to styles (laterally). 9

Fruit flattened at right angles to styles (dorsally). 10

9. Taprooted plants 3-5 dm. tall; leaves finely dissected, carrot-like; fruit about twice as long as broad; introduced. *Carum*

Tuberous rooted plants often more than 5 dm. tall; fruit not much longer than broad; wetland species. *Cicuta*

10. Styles with enlarged bases. *Lomatium*

Styles not enlarged at base. *Angelica*

11. Flowers yellow; fruit rounded, not flattened, with tubercles; of dry habitats. *Musineon*

Flowers white, purple or yellow; fruit flattened, without tubercles. *Lomatium*

ANGELICA L. - Angelica

Common Characteristics

- Tall perennials, glabrous below.
- Leaves broad, ovate, large.
- Blades 2-3 times pinnate, again toothed.
- Umbels large, with numerous primary rays and densely flowered secondary umbels.
- Bractlets very narrow.
- Sepals absent or minute, petals white or yellow; stylopodium present.
- Fruit glabrous, flattened dorsally, with narrow wings on dorsal ribs, broader wings on lateral ribs.

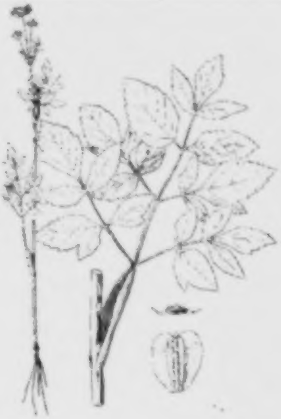
Key to Angelica

1. Flowers white (pinkish); primary umbel without involucral bracts. *A. arguta*

Flowers yellowish-green; large leafy involucral bracts present on umbels. *A. dawsonii*

Angelica arguta Nutt. - White Angelica

Growth Habit: **Tall, stout plants 5-20 dm. in height.**

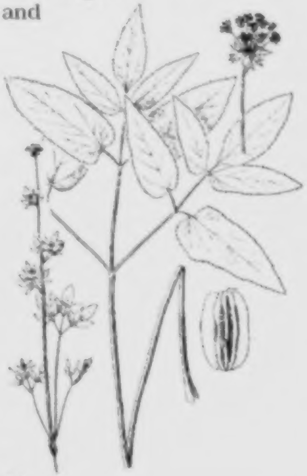


Blades: **Leaf stalks with conspicuous sheathing bases**; leaflets ovate-lanceolate, 4-12 cm. long, glabrous or with hairs on veins below, **irregularly lobed and spiny-toothed**.

Inflorescence: Umbel rays and pedicels webbed; **primary umbels lacking bracts**, the secondary ones with a few narrow bracts or none; inflorescence glabrous or obscurely scabrous; **flowers white (pinkish)**; fruit ovoid, 4-6 mm. long, glabrous, flattened dorsally, the lateral ribs with broader wings.

Similar Species:

1. ***Angelica dawsonii*** S. Wats. - Yellow Angelica
   Found in much the same habitats and with a similar distribution.
   Differs as follows:
   - More slender plants to 10 dm. tall.
   - Leaves also spiny-toothed but less irregularly lobed.
   - Leaflets lanceolate.
   - Umbels with conspicuous slashed bracts.
   - Flowers yellow.



Habitat & Distribution: Confined to the southern Rocky Mountain region where locally abundant in moist woods, in clearings. A species of medium rich, mesic mixed and conifer forests.

Forage Value: Fair for cattle, good for sheep and game; angelica is one of our more productive forbs when occurring in areas where it is best adapted.

Grazing Response: Increasers #1; the large heavy root systems are capable of storing large food reserves and thus ensuring survival in adverse conditions; under continuous and very heavy livestock use, however, populations will decrease in prominence as seed supplies are depleted and vigor declines.

Notes: The generic name is derived from the Latin *angelicus*, angelic, originating with a belief involving mystical medicinal properties of the genus, the roots once used as good luck charms and in religious rituals.

CICUTA L. - Water Hemlock

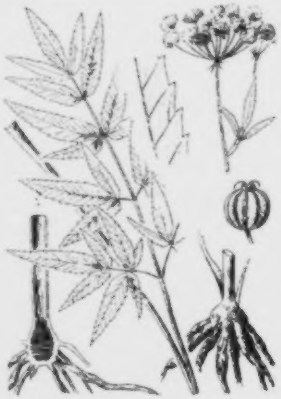
Common Characteristics

- Perennials from stout, tuberous-thickened roots, these divided into chambers by transverse partitions.
- Leaves divided pinnately several times.
- Primary umbels without bracts, secondary umbels with narrow bracts.
- Flowers with calyx teeth well developed, petals small, white-greenish.
- Fruit flattened laterally, oval, about as long as broad.
- Fruit hairless, 5-ribbed.

Key to Cicuta

1.	Leaflets lanceolate; bulblets not produced in upper axils.	*C. maculata*
	Leaflets linear, "feathery"; upper axils producing bulblets.	*C. bulbifera*

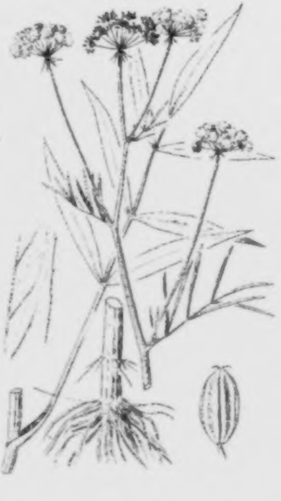
Cicuta maculata L. var. ***angustifolia*** Hook. - Western Water Hemlock



Growth Habit: Plants **with thickened tuberous and chambered bases, a number of the "true roots" also often thickened; stems 6-18 dm. tall, stout, hollow**, mostly hairless.

Blades: Leaves basal and cauline, **several times pinnate**, the leaflets **lanceolate-ovate to narrowly lanceolate**, these **3-10 cm. long** and often over 1 cm. wide, **coarsely toothed**.

Inflorescence: **Umbels 1-several**, compound; primary umbel 18-28-rayed, the secondary ones with 12-25 rays; petals **small (5), whitish-green**; fruit **ovate-circular, 2-4 mm. long; longer than broad**, ribbed.

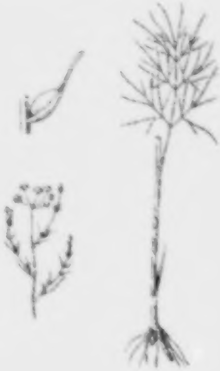


Similar Species:

1. ***Sium suave*** Walt. - Water Parsnip
   Common in all regions in wet places.
   Differs:
   - Roots not tuberous or chambered.
   - Leaves usually only once pinnate (aquatic ones sometimes feathery-many times pinnate).

2. ***Cicuta bulbifera*** L. - Bulb-bearing Water Hemlock
Occasional in swampy and boggy areas, less common southward.
Differs as follows:

- Plants more slender, to only 8-9 dm. tall.
- Leaflets linear, "feathery", only sparsely toothed.
- Upper leaves small, simple, with bulblets produced in their axils.
- Fruit not maturing.



Habitat & Distribution: Common, distributed throughout most regions. Found on shores, along streams, in marshy and swampy places, in wet ditches.

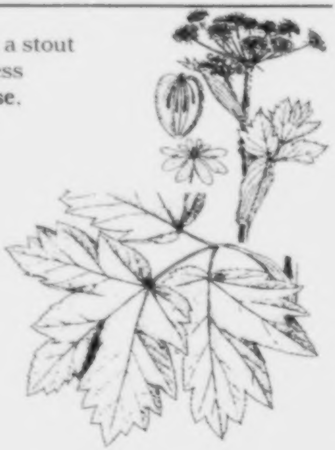
Forage Value: Poor, and all water hemlock species are extremely toxic to livestock and game; roots and lower stems are most poisonous, the foliage to a lesser degree, although leaves have been known to kill livestock (young growth with highest concentrations); the poisonous principle, cicutoxin, is visible in dissected roots and crowns as a malodorous yellowish oil; a root fragment the size of a walnut can kill a mature cow; although not palatable, *Cicuta* species are potentially dangerous when wetlands are heavily utilized due to overgrazing, or in the case of late-season drying of upland grasses, also when roots are exposed by water erosion and mechanical disturbances.

Grazing Response: Increasers.

Notes: Syn. *C. douglasii*; *Cicuta* is an ancient Latin name used by Pliny, originally referring to this or another poisonous member of the family; also known as spotted water hemlock (*maculata* means spotted); surprisingly, water hemlock is recognized to have some medicinal properties, split roots sometimes applied to rattlesnake bites to draw out poison; *Cicuta* species were also used for suicide by people of many cultures, some native N. Americans believed the plants to have special powers, and pieces of root were fitted onto arrows, the wound inflicted supposedly causing death; water hemlock is so violently poisonous that care must even be taken when examining and dissecting roots. *Note:* Water parsnip is frequently found growing with water hemlock, and although often blamed for poisonings, is non-toxic.

HERACLEUM L. - Cow Parsnip

Heracleum lanatum Michx. - Cow Parsnip



Growth Habit:	Perennials with a **strong odor**, from a stout taproot, sometimes from more or less clustered fibrous roots; stems **coarse, hollow, sparsely to densely woolly-hairy, 1-2 m. tall**.
Blades:	Leaves **large, ternate**, the leaflets stalked, **palmately lobed and coarsely toothed, cordate-based, 1-3 (4) dm. long and broad**; leaves somewhat paler and soft hairy below (especially on veins), nearly hairless above; stalks with **conspicuous swollen, hairy dilated sheaths**.
Inflorescence:	Umbels compound, densely hairy at base, with lanceolate, early deciduous bracts; inflorescence large, the **terminal umbel 1-2 dm. wide**, the rays 15-30, and often up to 10 cm. long; flowers **white, irregular**, with larger and smaller petals, the outer flowers of the umbel largest; petals notched; fruit **flattened, about 1 cm. long**, obovate, hairless to finely hairy, **winged on margins**, the face with narrow ribs and dark vertical lines (oil tubes).
Habitat & Distribution:	Frequent in all regions except absent from the prairies. Found in moist woods and thickets, in moist meadows, on slopes at higher elevations. An indicator of fertile mesic-subhygric ecosites, often associated with ferns and deciduous woody species in western regions.
Forage Value:	Good, the foliage fairly nutritious throughout the growing season, also palatable, especially the young growth; a large leafy species, and often forming thick stands, cow parsnip is one of our most productive forbs.
Grazing Response:	A decreaser, in some cases an increaser #1, depending on livestock accessibility and overall utilization of the areas inhabited by the species; as with other palatable members of the family, *H. lanatum* produces an abundance of seed and stores relatively large food reserves in its roots, and as such is capable of withstanding fairly heavy grazing.
Notes:	*Heracleum*, in honor of Hercules, because of the species' large, vigorous growth form; *lanatum*, translates woolly, alluding to the hairs on the plants; *H. lanatum* was a widely used species by aboriginal people, the young shoots eaten, and the stalks were part

of Sun Dance rituals of the Blackfoot Tribe; as well, cow parsnip is reputed to cure a number of medical problems: root decoctions and poultices used to treat sores, boils, rheumatism and arthritis, epilepsy, and even paralysis; both seed and root decoctions were taken for nausea, gas, and spastic colon.

LOMATIUM Raf. - Prairie Parsley

Common Characteristics

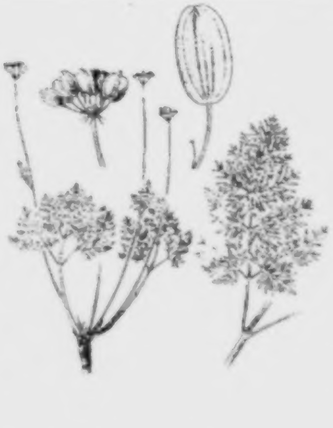
- Perennials with taproots, these short and somewhat tuberous, or elongate, woody, sometimes slender.
- Plants mostly acaulescent or short-caulescent.
- Leaves compound, either ternately so, or 2-5 pinnate, with small ultimate divisions.
- Inflorescence compound, bracts mostly lacking, bractlets usually present.
- Calyx lobes small to obsolete.
- Petals white, yellow, or purple, incurved.
- Stylopodium absent.
- Fruit linear to orbicular, glabrous to pubescent, dorsally flattened, lateral wings evident, thin to corky, the dorsal wings not developed.

Key To Lomatium

1.	Leaves with a few very narrow linear segments.	*L. triternatum*
	Leaves more divided and segments broader, or linear and very numerous.	2
2.	Ovary and fruit pubescent.	*L. foeniculum*
	Ovary and fruit glabrous at maturity.	3
3.	Stems densely hairy, 1-5 dm. tall; of dry sites.	*L. macrocarpum*
	Stems glabrous; tall plants (3-12 dm.) with numerous fine linear leaflets, bracts linear; of rich, moist sites.	*L. dissectum*

Lomatium dissectum (Nutt.) Mathias and Constance var. ***multifidum*** (N.) M. and C. - Mountain Wild Parsnip

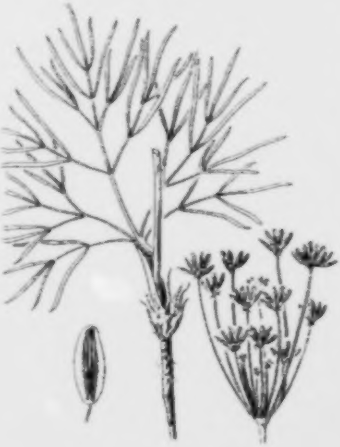
Growth Habit:	**Large perennials from extensive, woody taproots** and often a branched, woody crown; **stems present, 3-12 dm. tall**, ascending-erect, **glabrous**, strongly ridged and often purple-tinged.
Blades:	**Leaves large, basal and cauline, 1-3 dm. wide, ternate and again finely 2-4 pinnate into linear (fern-like) divisions**, finely scabrous, mostly below on veins and on midribs.



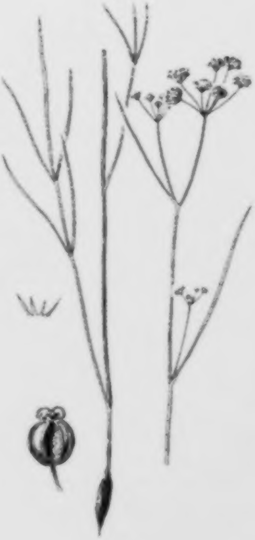
Inflorescence: Flowers surpassing leaves, the rays 10-30 per umbel, the longest 4-10 cm. long; **flowers yellow or purple**, their pedicels 4-20 mm. long; **fruit elliptic, 10-14 mm. long**, the lateral wings narrow and corky-thickened, about 1 mm. wide, **glabrous**.

Similar Species:

1. ***Lomatium triternatum*** (Pursh) Coult. & Rose - Western Wild Parsley
   Found in the southern foothills, montane and prairie regions and in the Cypress Hills. Grows from lowlands to montane elevations, found in moist prairie grassland, on open slopes and hillsides, on fluviale terraces.
   Differs as follows:
   - Somewhat smaller acaulescent to caulescent plants from slender taproots, 2-8 dm. tall.
   - Blades with rather few ternate, then pinnate, bipinnate or linear divisions, (ultimate segments linear).
   - Flowers more consistently yellow.

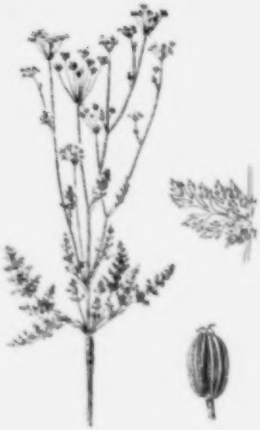


2. ***Perideridia gairdneri*** (Hook. & Arn.) Mathias ssp. ***borealis*** Chuang and Constance - Squaw-root
   Found in southern fescue grasslands, in open woods and meadows.
   Distinguished as follows:
   - Roots tuberous.
   - Blades once-pinnate, the leaflets entire, 1-2 mm. wide, 4-12 cm. long.
   - Flowers whitish.
   - Fruit rounded, about 2 mm. long, flattened laterally, glabrous.



Other Species:

1. ***Carum carvi*** L. - Caraway
   An introduced plant, becoming common in western regions and now considered a threat to native fescue grasslands and open woods. Distinguished as follows:
   - Glabrous biennials, 3-8 dm. tall, branched.
   - Leaves dissected, "carrot-like", the ultimate segments linear.
   - Flowers white, in compound umbels.
   - Bracts and bractlets absent or filiform.
   - Sepals absent, petals white or pink-tinged.
   - Fruit oval-oblong, 3-4 mm. long, glabrous, flattened laterally, with conspicuous ribs.



Habitat & Distribution:

Common but restricted to southern foothills and Rocky Mountain regions. Grows on lush slopes, in moist, grassy meadows, in open woods.

Forage Value:

Fair, the larger leafy species such as *L. dissectum* moderately palatable, especially so to sheep and game; *L. triternatum* is less often utilized, also with inferior productivity.

Grazing Response:

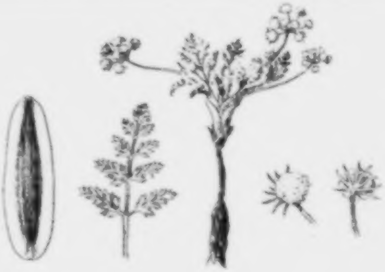
Increasers, *L. triternatum* more likely to be prominent on heavily grazed range because of lower palatability ratings.

Notes:

The generic, from the Greek *loma*, a border, describing the winged fruit, the specific names in reference to leaf characteristics; *L. dissectum* is also known as "chocolate tips", for the purple-flowered forms; all members of the genus have edible seeds and roots, the inner portions of roots at one time ground into flour and made into biscuit-like cakes; medicinally, the plants were used in the treatment of pneumonia, chest and sinus infections, and root infusions effective as an anticeptic wash and used as an antiviral treatment; superstitions involved the use of the root, pieces tied around a mare's neck in the belief that she would have a strong colt, also thought to be a good luck charm and horses with distemper were supposedly cured by inhaling the smoke from burning roots; the root of *Perideridia* was similarly and extensively used both as a food source and to treat respiratory ailments, also known as diuretic and laxative; all of our *Lomatium* species have considerable adaptations to a wide range of soil and moisture conditions, and can be recommended for re-seeding projects in their respective ranges.

Lomatium macrocarpum (Hook. & Arn.) Coult. & Rose - Long-fruited Parsley

Growth Habit: Perennials from taproots, these either thick-tuberous throughout or tuberous on lower portions, thinner above; crowns more or less simple, sometimes subterranean; **stems short-caulescent, moderately to densely pubescent, purple below, 1-5 dm. tall.**

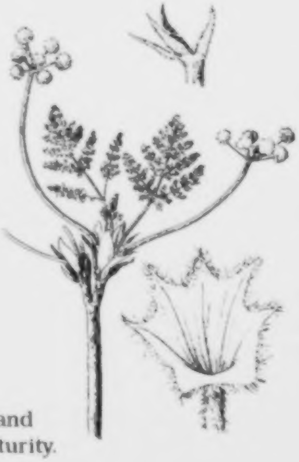


Blades: Leaves clustered at or near base, **3-12 cm. long, with purplish-based petioles**; blades ternate and 2-3 pinnate, the segments to 9 mm. long and **2 mm. wide; leaves grey-green, sparsely to moderately pubescent-villose; sheaths at base of plant conspicuous, membranous and purple-tinged.**

Inflorescence: Umbels overtopping leaves; longer rays 2-6 cm. long; **flowers white to purple (rarely yellow)**, with the bractlets well developed and often exceeding them; fruit narrowly elliptic to linear-oblong, **10-20 mm. long, usually finely pubescent at first, becoming glabrous**, the wings narrow.

Similar Species:

1. ***Lomatium foeniculum*** (Nutt.) Coult. & Rose - Prairie Parsley
   One of several other prairie parsley species, found in the eastern prairies as well as in the northern parkland area. Grows in prairie grassland and on open, dry slopes.
   Differs as follows:
   - Plants more consistently acaulescent and more evenly hairy, foliage rarely glabrate with age.
   - Bractlets broader, distinctly united below.
   - Flowers yellow.
   - Fruit shorter (7-10 mm. long) and ovate-oblong, pubescent at maturity.



Habitat & Distribution: Frequent in southern regions. Found on dry, open hillsides, in dry prairie grassland, on rocky and exposed slopes in foothills and montane areas.

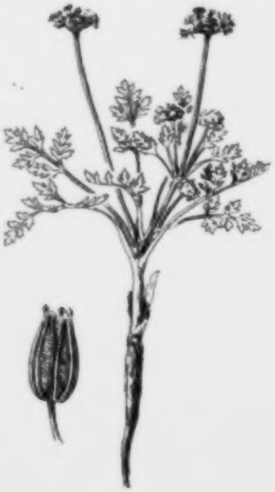
Forage Value: Poor, our smaller species producing little forage of inferior palatability.

Grazing Response: Increasers.

Notes: Both the specific name *macrocarpum* and the common name refer to the fruits which are large as compared to overall plant size; as with all members of the genus, *L. foeniculum* and *L. macrocarpum* have edible tuberous roots, also possess medicinal antibacterial/ antiviral properties, and were part of traditional treatments for respiratory ailments; most small members of the family are attractive in arid gardens but usually wither by mid-summer in warm, dry conditions.

MUSINEON Raf. - Musineon

Musineon divaricatum (Pursh) Nutt. - Leafy Musineon



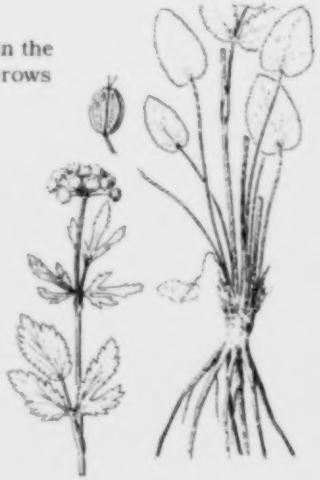
Growth Habit: Perennials from stout, woody taproots and simple caudices; plants with **stems branched and often spreading, 0.5-3 dm. tall, roughened**, more densely so just below heads.

Blades: Leaves subopposite, **to about 10 cm. long** (including stalks), **ternate-pinnate into oblong leaflets** and again cleft; primary divisions nearly stalkless; axis wing-margined; leaflets **mostly hairless**.

Inflorescence: Umbels 1-3 cm. broad, mostly shorter than leaves; bracts absent, bractlets 3, linear; flowers **yellow; fruit ovoid-oblong, 3-6 mm. long, only slightly flattened** parallel to styles, with prominent ribs, **roughened**.

Other Species:

1. ***Zizia aptera*** (A. Gray) Fern. - Meadow Parsnip
   Common throughout, especially in the foothills and parkland regions. Grows in moist grassland.
   Distinguishing features:
   - Hairless plants 2-6 dm. tall.
   - Basal leaves not deeply divided, long-stalked, oval-oblong and heart-shaped at the base, toothed.
   - Upper leaves 3-divided 1 to 2 times.
   - Flowers bright yellow.
   - Fruit oval-oblong, 2-4 mm. long, smooth, slightly flattened.



Habitat & Distribution: Frequent in the prairie, southern montane/foothills ecoregions, occasional in the parkland. Grows in dry prairie grassland, on open, exposed slopes and hillsides. Tolerant of alkali, and sometimes found on open alkali flats, in heavy clays.

Forage Value: Fair; musineon (along with other smaller members of the family such as meadow parsnip (*Zizia aptera*) and *Lomatium* species), is fairly palatable and nutritious but provides considerably less forage than its larger relatives.

Grazing Response: Increasers #1.

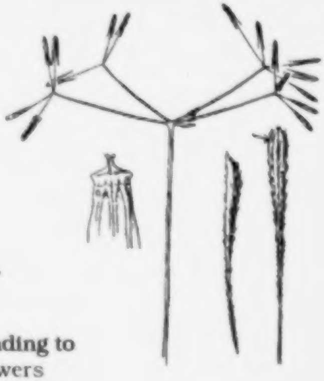
Notes: *Musineon*, an ancient Greek name for some member of the parsley family, the specific name referring to the spreading growth form; roots, as with those of *Lomatium* species, were eaten raw or roasted, or ground into flour for biscuits; *Lomatium*, in particular, possessed medicinal qualities, various species used to treat sinus and chest infections, pneumonia, tuberculosis, and roots infused to make an antiseptic wash; smaller members of the family, in particular those with delicate, fern-like leaves, make attractive ornamentals, also are of some worth in reclaiming native rangelands in an attempt to maintain species diversity; *Musineon*, adapted to heavy and often alkali clays and exposed slopes, is especially valuable as it will grow in areas where vegetation cover is naturally rather sparse and where numerous other species would have difficulty surviving.

OSMORHIZA Raf. - Sweet Cicely

Common Characteristics

- Perennials from thick taproots, these sweet-aromatic.
- Plants with leafy stems, 2-6 dm. tall.
- Leaves several times pinnate, the lower stalked.
- Leaflets lanceolate to obovate, incised.
- Umbels rather small and loose, with small whitish to yellowish or purple flowers.
- Fruit long and narrow (linear to club-shaped), the top blunt to constricted.
- Fruit bristly except in one species.

Osmorhiza depauperata Philippi - Sweet Cicely



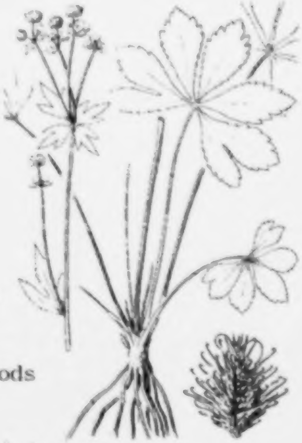
Growth Habit: Plants from well developed taproots and somewhat branched caudex, **not strongly licorice-odored**; stems hairless to bristly-hairy, 2-6 dm. tall.

Blades: Leaves **several times pinnate**; leaflets **thin, ovate, incised or deeply 3-lobed**, 2-7 cm. long, sparsely bristly-hairy on veins above, more densely so below.

Inflorescence: Rays 2-5, **they and stalks wide-spreading to reflexed**; bractlets mostly absent; flowers small, **greenish-white**, fruit **10-15 mm. long, narrow-club-shaped, narrowed at top** but convexly so, **bristly**.

Other Species:

1. ***Sanicula marilandica*** L. - Snake-root
   Frequent in foothills and parkland regions. Found in rich moist woods and thickets, on shores.
   Distinguished as follows:
   - Hairless plants 3-8 dm. tall.
   - Blades palmately divided (unique for the family).
   - Leaflets obovate, toothed, 5-10 cm. long.
   - Fruit unique: ovoid-shaped, covered with hooked prickles.



Habitat & Distribution: Frequent throughout most regions except the prairies. Grows in moist woods and thickets.

Forage Value: Fair, plants both nutritious and palatable to livestock and game until freeze-up after which they provide little useful grazing; however, in spite of a widespread distribution, sweet cicelys are never very abundant, producing relatively small amounts of forage.

Grazing Response: An increaser #1; although entirely depending upon seed for reproduction, the fleshy roots store enough food reserves to enable plants to withstand fairly heavy grazing.

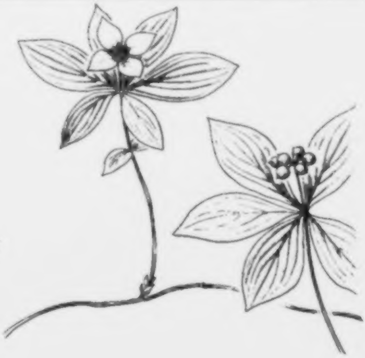
Notes: From *Osme*, scent, and *rhiza*, root, because of the sweet licorice odor of the roots of most species (*O. occidentalis*, confined to the s. Rocky Mountains, with yellowish flowers, glabrous fruits, is very strongly scented); also known very appropriately as sweet root, as it has a very palatable, somewhat root beer taste; members of the genus had significant medicinal value, used to clear mucous membranes, cure constipation and other digestive ills, also for sore throats and as an aid in childbirth (some native tribes also washing newborn babies in a solution containing sweet cicely), and some tribes believed that *O. chilensis* was a powerful love charm; snakeroot (*Sanicula marilandica*) has received a similar rating as a range species, and like other edible members of the family, was a source of greens, and roots were roasted or ground into flour (hence the names biscuit root, squaw root and prairie parsley were used); all non-poisonous members of the parsley family are valued as indigenous parts of the ecosystem, thus any efforts to include them in reclamation mixes should be encouraged; *S. marilandica*, because of its rhizomatous habit, is of particular interest for binding soil and erosion control.

CORNACEAE - Dogwood Family
CORNUS L. - Dogwood

Common Characteristics

- Trees, shrubs or herbaceous/subshrubs.
- Leaves simple, opposite or in terminal whorls, petiolate, the venation rather prominent (pinnate); exstipulate.
- Flowers small, regular, perfect, epigynous, polypetalous, in open to congested cymes or heads.
- Stamens, sepals (these small) and petals each 4, the pistil of 2 carpels, style 1; ovary inferior, 2-locular.
- Fruit fleshy, red or white, a 1 or 2-seeded drupe, the endocarp hardened, stone-like.

Cornus canadensis L. - Bunchberry



Growth Habit: Low perennials, **forming colonies from extensive creeping rootstocks**; stems essentially herbaceous (bases often somewhat woody), green to reddish, glabrous to hairy, **5-20 cm. tall, erect**.

Blades: Lower leaves reduced to 1-2 pair of bracts; **upper blades in a terminal whorl of 4-6**, subsessile, **obovate-rhombic to elliptic-ovate, 2-8 cm. long**, bases cuneate, the apex acute; **blades dark green above**, with scattered scabrous hairs, **the lower surface paler** and sparsely pubescent, **veins conspicuous**.

Inflorescence: Flowers in a terminal cyme, **subtended by 4 showy white-greenish ovate bracts 1-2 cm. long**; petals white-greenish, to 1.5 mm. long; hypanthium densely strigose, the lobes very short; **drupes showy, bright red, globose, 6-8 mm. long**.

Habitat & Distribution: Very common and widespread, but absent from the prairie region. Grows in moist, shaded woodlands and forests, common in climax coniferous forests.

Forage Value: Poor, only marginally palatable and providing relatively little forage.

Grazing Response: An increaser under forest cover, decreases with clearing.

Notes: *Canadensis*, a reference to Canada-wide distribution, although globally, the species is much more widespread; an edible plant, but cooking is recommended to avoid adverse stomach trouble caused by raw berries; medicinally, infusions have been taken for paralysis, colic and to counteract the effects of ingesting poisonous food; externally, poultices can be applied to burns, washes used for insect stings and skin rashes and there is some recent evidence that the plants have some anti-cancer properties; bunchberry is a very attractive woodland species, suitable for use in shaded gardens, and valued as ground cover in climax forests where many species, less shade and acid tolerant, do not persist.

PYROLACEAE - Wintergreen Family

Common Characteristics

- Hairless, herbaceous plants from slender, scaly rhizomes.
- Stems usually leafless above the base, but with small bracts.
- Leaves evergreen, simple, stalked, clustered (often a rosette) at the base.
- Flowers mostly regular, perfect.
- Calyx (4) 5-lobed, corolla of 5 separate petals, sometimes unequal.
- Style straight or bent to one side, often with an apical collar.
- Fruit a nearly spherical capsule with numerous, small seeds.

Key to Pyrolaceae

1. Stems with leaves; inflorescence in corymbs or umbels. *Chimaphila*

Stems leafless, with a few reduced bracts; flower solitary or inflorescence in narrower racemes. 2

2. Flower one per stem, nodding. *Monenses*

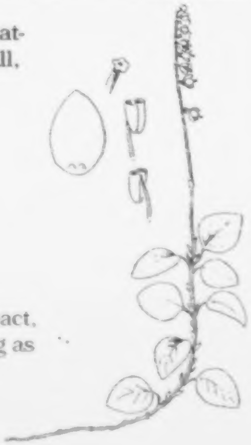
Flowers more than one. 3

3. Racemes not one-sided, flowers not bell-shaped, variously colored. *Pyrola*

Racemes one-sided (secund), flowers bell-shaped, whitish. *Orthilia*

ORTHILIA Raf. - One-sided Wintergreen

Orthilia secunda (L.) House - One-sided Wintergreen



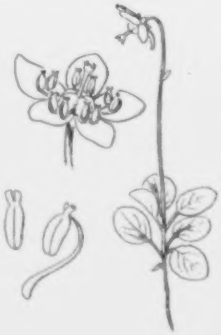
Growth Habit: Plants from slender rhizomes, and **often mat-forming; stems** mostly solitary, **5-15 cm. tall, with a few small scattered bracts.**

Blades: **Blades oval-ovate, the apex acute and often mucronate**, the base rounded. **1.5-5 cm. long**; blades often numerous, **on petioles usually somewhat shorter**; leaf margins from nearly entire to crenate-serrate.

Inflorescence: **Racemes 1-sided**, rather narrow and compact, 6-20 flowered; bracts narrow, about as long as pedicels (3-8 mm. in length); sepals to 1 mm. long, with fringed lobes; flowers **bell-shaped**, the **petals white, 4-5 mm. long**, with 2 small tubercles on the inner surface at the base; styles exserted, 3-8 mm. long, straight, without collar; stigmas with 5 broad lobes; basal ovary disc with 10 small glands; fruit a nearly spherical capsule.

Similar Species:

1. ***Monenses uniflora*** (L.) A. Gray - One-flowered Wintergreen
   Common in woodlands in all regions except the prairies and parkland.
   Differs as follows:
   - Leaves mostly basal, ovate-obovate, toothed to entire.
   - Flowers white, nodding, solitary.



Habitat & Distribution: Common except in the southern prairie region. Found in wooded areas: in dry to moist coniferous forests, in mixed and sometimes deciduous woods.

Forage Value: Poor.

Grazing Response: Increasers.

Notes: Syn. *Pyrola secunda*, the specific name referring to the one-sided floral arrangement; both *O. secunda* and *Monenses* can be successfully transplanted into cool, shaded gardens along with other low growing species, and will survive at relatively high altitudes and northern latitudes.

PYROLA L. - Wintergreen

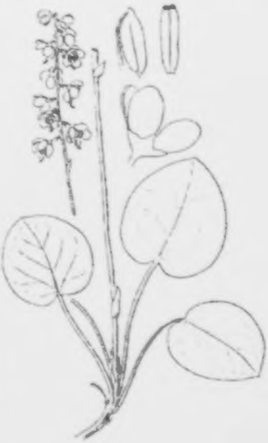
Common Characteristics

- Rhizomatous perennials, glabrous.
- Leaves evergreen, basal.
- Scapes with a few bracts, flowers in racemes.
- Flower parts in 5's, stamens 10.
- Style often upward curved.
- Capsules opening from base, spherical, with cobwebby hairs evident when opening.

Key to Pyrola

1.	Styles linear, not broadened upward, straight.	*P. minor*
	Styles broadened upward, curved.	2
2.	Petals pink-purple; leaves mostly entire.	*P. asarifolia*
	Petals greenish-white.	3
3.	Leaves 1-3 cm. long, obovate-rounded, usually shorter than petioles.	*P. chlorantha*
	Leaves 3-7 cm. long, oblong-elliptic, longer than the petioles.	*P. elliptica*

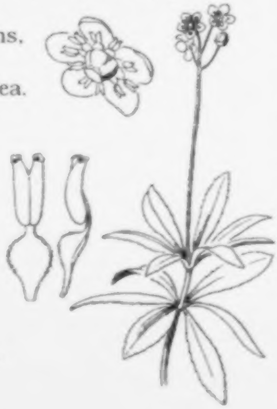
Pyrola asarifolia Michx. - Common Pink Wintergreen



Growth Habit:	Plants **with extensive rhizomes**; stalks leafless, **15-30 cm. tall**, commonly **with 1-3 scales scattered along stem**.
Blades:	Blades **thick, dark green and shiny above, paler and sometimes purple-tinged below**; blades **3-8 cm. long and almost as broad, kidney-shaped to oval**, the base **cordate**, the top **rounded**, the margin **nconspicuously shallow-toothed**; stalks equalling or exceeding blades.
Inflorescence:	Racemes elongate, about **10-20 flowered**, the stalks spreading; sepals about 1/2 as long as petals, the lobes pointed; petals **5-7 mm. long, pink to purplish; styles strongly curved and with collars at top; capsules rounded**, many-seeded, **with tangled hairs when opening**.

Similar Species:

1. ***Chimaphila umbellata*** (L.) Bart. ssp. ***occidentalis*** (Rydb.) Hult. - Prince's Pine; Pipsissewa
   Most common in the Rocky Mountains, with disjunct populations in the Cypress Hills and northern boreal area. Found in mesic, medium rich coniferous forested areas.
   Distinguished as follows:
   - Plants from rhizomes, 1-3 dm. tall.
   - Stems somewhat woody, sometimes branched, with leaves present, scattered or in whorls.
   - Leaves evergreen, thick, shining, 2-7 cm. long, short stalked, oblanceolate and serrate above the base.
   - Flowers 4-8 in corymbs or umbels, white to pink-purple, the petals 4-6 mm. long, fragrant.
   - Styles very short.
   - Fruit a capsule.



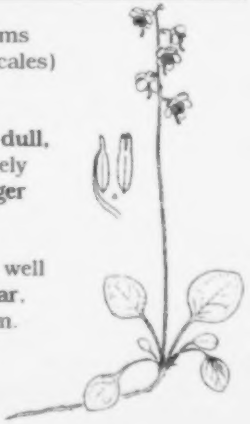
Habitat & Distribution: Common throughout except in the prairie region. Found in moist wooded areas: deciduous, mixed and coniferous forests, also sometimes in rather boggy woods.

Forage Value: Poor, all members of the genus producing little forage and this is generally not palatable.

Grazing Response: Increasers, but not considered invasive, usually found in areas classed as marginal rangeland.

Notes: *Pyrola*, from the diminutive of the Latin *pyrus*, pear tree, as the leaves of some species are pear-shaped; the specific name given by Micheaux who saw a resemblance between the leaves and wild ginger (*Asarum*); the term wintergreen refers to the evergreen foliage of most species; the source of wintergreen oil is actually *Gaultheria procumbens* (related *Gaultheria* species native locally); *Pyrola* species have been recognized as possessing numerous medicinal properties, solutions of wintergreen used as an antispasmodic (useful for epilepsy), diuretic, scorbutic, tonic to treat sore throats and eyes, and urinary disorders, and poultices applied to stop bleeding, and to treat bruises and insect bites; Blackfoot Indians used infusions to expel afterbirth, as a laxative, and to treat coughs; wintergreens are attractive plants, their evergreen foliage useful in shaded gardens, probably most successfully propagated by transplanting.

Pyrola chlorantha Sw. - Greenish-flowered Wintergreen



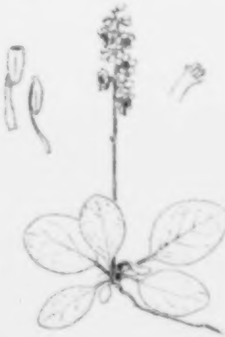
Growth Habit: Glabrous plants from slender rhizomes; stems 8-20 cm. long, leafless (but with 1-2 small scales) or with 1-2 leaves at base.

Blades: **Leaves thick, green, somewhat paler below, dull, oval-obovate, rounded at both ends**, obscurely toothed to entire, **1-3 cm. long; petioles longer than blades**.

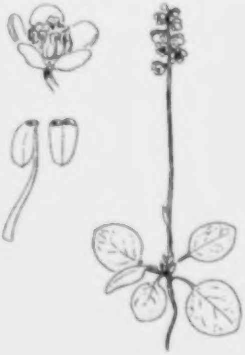
Inflorescence: Racemes 2-8 flowered, elongate, the flowers well separated and nodding; **calyx lobes triangular**, about as broad as long, the sepals to 1.5 mm. long; petals **5-7 mm. long, greenish-white; anthers with well developed straight tubes; styles 3-6 mm. long, curved and collared near tip**.

Similar Species:

1. ***Pyrola elliptica*** Nutt. - White Wintergreen
   Most common in the parkland region, also in Cypress Hills and in a few locations in the north. Grows in rich, moist wooded areas.
   Differs as follows:
   - Blades larger (3-7 cm. long) and longer than petioles.
   - Leaves broadly elliptic to oblong, narrowed at the base.



2. ***Pyrola minor*** L. - Lesser Wintergreen
   Frequent in the foothills and southern Rocky Mountain region, with scattered populations in Cypress Hills and in the boreal forest. Found in moist woods.
   Differs from *P. chlorantha* as follows:
   - Blades similar but often somewhat larger (to 4 cm. long).
   - Blades and petioles about equal in length.
   - Petals somewhat smaller (4-5 mm. long), white or tinged with pink.
   - Styles straight, included.
   - Anthers short, not produced into tubes.



Habitat & Distribution: Common throughout most ecoregions. Absent from the dry prairie region. Found mostly in coniferous forests, usually in rather moist locations.

Forage Value: Poor (all three species).

Grazing Response: Increasers but not invasive.

Notes: Syn. *P. virens*; both alternative and specific names translate green or green-flowered; traditional human use of the genus for its healing properties was extensive (see *P. asarifolia*). *P. elliptica* specifically identified as a treatment for sore throats and cankers, root teas taken for so-called "black sickness" and general weakness; all wintergreens can be appreciated as attractive understory ground cover vegetation, establishing and persisting with the encroachment of woody species in their respective ranges.

PRIMULACEAE - Primrose Family

Common Characteristics

- Annual or perennial herbs from taproots, rhizomes or short caudices and fibrous roots.
- Leaves simple, entire or less often toothed, opposite, whorled, or all basal.
- Flowers regular, perfect.
- Sepals 4-5, united, corolla usually present, of united petals.
- Stamens equalling and opposite corolla lobes.
- Fruit a capsule.

Key to Primulaceae

1.	Corolla lacking; calyx corolla-like, pink to white, leaves opposite, small, fleshy; of depressional saline areas.	*Glaux*
	Corolla evident.	2
2.	Leaves mostly cauline.	3
	Leaves in basal rosettes.	4
3.	Leaves opposite, distributed along stem; flowers yellow.	*Lysimachia*
	Leaves whorled at stem tips; flowers white; boreal species.	*Trientalis*
4.	Corolla lobes purplish, reflexed; stamens united, with anthers converging around style.	*Dodecatheon*
	Corolla lobes not reflexed; stamens not united.	5
5.	Corolla lilac-pink, the tube equal to or longer than calyx; style elongate.	*Primula*
	Corolla white, the tube up to the length of the calyx; styles very short.	*Androsace*

ANDROSACE L. - Fairy Candelabra

Common Characteristics

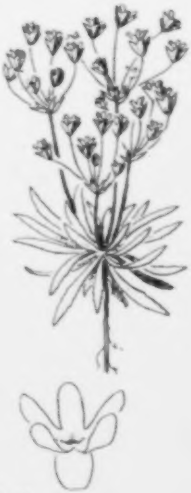
- Small, scapose plants.
- Blades in rosettes, either at the tips of short caudex branches or on the basal crown.
- Flowering stems 1-several, each terminated by an involucre and umbel.
- Flowers small, the calyx and corolla 5-lobed.
- Corolla salver-shaped to funnelform, whitish, the tube shorter than the calyx, the throat constricted.
- Stamens 5, included.
- Style minute.
- Fruit a small, few to many-seeded capsule.

Key to Androsace

1. Annuals, corolla and calyx about the same length; umbels open, on pedicels over 5 mm. long; widespread. *A. septentrionalis*

Perennials; corolla with a yellow eye, much longer than calyx; umbels head-like, on very short pedicels; Rocky Mountain species. *A. chamaejasme*

Androsace septentrionalis L. - Fairy Candelabra



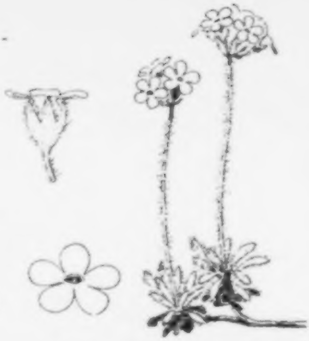
Growth Habit: **Small annual (winter annual)** or possibly short-lived perennial; scapes 1-numerous, **2-25 cm. tall**, sparsely pubescent to rather evenly glandular pubescent, with branched hairs.

Blades: **Leaves in a single basal rosette, linear-oblanceolate, entire to toothed, 5-25 mm. long**, glabrous to glandular-pubescent.

Inflorescence: **Involucre bracts narrow, linear to lanceolate**, 3-6 mm. long; **pedicels ascending, 3-20**, the outer curved, glabrous to glandular-hairy, **1-15 (20) cm. long**; calyx tube cup-shaped, pale, longer than the green lobes, 5-ridged; **corolla about as long as calyx (2.5-4 mm. long), white to pinkish**; capsules spherical, about equalling calyx tube, with numerous dark brown seeds.

Similar Species:

1. ***Androsace chamaejasme*** Host -
   Sweet-flowered Androsace
   Rather common but restricted to foothills and southern Rocky Mountain regions. Grows on rocky banks and slopes, on moist, often wooded river banks and shores. Differs as follows:
   - Plants perennial, stoloniferous, the nodes and stolon tips producing rosettes of leaves.
   - Plants mat forming, these up to 1 dm. broad.
   - Blades smaller (4-10 mm. long), conspicuously ciliate.
   - Scapes shorter (2-10 cm. tall), with longer white-villose pubescence.
   - Involucre and calyx with white multicellular hairs.
   - Umbels head-like, on very short pedicels.
   - Flowers fragrant, small but showy, creamy-white and with yellow eye.



Habitat & Distribution:

Found throughout, most common in southern regions. Grows from low to fairly high elevations. Found on dry, open, often sandy or gravelly places, in disturbed areas.

Forage Value:

Poor, diminutive plants, producing little or no forage.

Grazing Response:

Increasers; although, by strict definition, *A. septentrionalis* is a weedy opportunistic species on exposed soil, it does not compete successfully once taller growing species establish; *A. chamaejasme* is less aggressive, but in some locations naturally high populations will occur.

Notes:

The generic name is taken from the Greek *androsakes*, a reference to some sea plant; the primrose family is large and diverse, comprised of about 700 species which range from minute, inconspicuous members to large and spectacular ornamentals; *A. chamaejasme*, although small and sometimes difficult to establish, is suitable for use in moist shaded rock gardens.

DODECATHEON L. - Shooting Star

Common Characteristics

- Perennials from rhizomes or caudices and fleshy fibrous roots, some species with small bulblets among roots.
- Plants stemless, with leaves in basal rosettes.
- Leaves simple and mostly entire.
- Flower several, in terminal umbels, the stalks reflexed, erect in fruit.
- Flower parts in 5's, the corolla deeply parted and the lobes reflexed, pink-purple.
- Stamens converging around the style, the anthers usually yellow; portion joining 2 anthers (connective) prominent.
- Fruit an ovoid-cylindrical capsule, with many seeds.

Key to Dodecatheon

1. Leaves smooth, without hairs; connective smooth in life, wrinkling in drying; teeth of capsules pointed. *D. pulchellum*

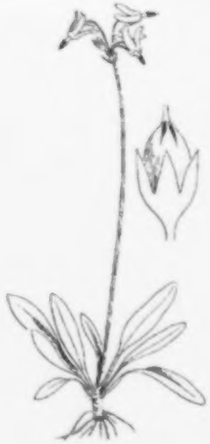
2. Leaves hairy, glandular; connective roughened in life and with folds; teeth of capsules obtuse-truncate. *D. conjugens*

Dodecatheon pulchellum (Raf.) Merr. - Saline Shooting Star

Growth Habit: Plants from **short, erect rhizomes**, without bulblets; flower stalks **5-50 cm. tall, hairless**.

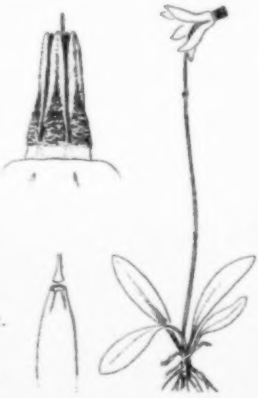
Blades: Leaves **in basal rosettes, hairless**, 2-15 cm. long, **lanceolate to oblong-spatula-shaped, entire to obscurely toothed, narrowed to winged stalks** about as long as blades.

Inflorescence: **Umbels with 5-12 flowers; calyx often purple-flecked**, lobes 3-5 mm. long; corolla 10-20 mm. long, **the lobes purplish-lavender, the tube yellow above, with a wavy purple line at the base**; filaments **0.5-3.5 mm. long**, yellow, anthers 3-8 mm. long, **the connective smooth, purple; pollen sacs yellow**; capsules **ovoid-cylindric, opening by valves**, 5-15 mm. long, mostly hairless, the **teeth pointed**.



Similar Species:

1. ***Dodecatheon conjugens*** Greene - Mountain Shooting Star
   Also found in moist places but not in alkaline soils. The species is common in but restricted to southern regions, most frequent in foothills and montane areas.
   Differs as follows:
   - Flower stalks shorter, 1-2 dm. tall, from very short rootstocks or only fibrous roots.
   - Blades at least somewhat glandular-hairy.
   - Filaments only 1-2 mm. long.
   - Connective rough, deep red-purple.
   - Pollen sacs dark purple-black.
   - Capsules operculate (opening by a lid), the teeth blunt.



Habitat & Distribution: Widespread, most frequent in foothills and parkland regions, occasional elsewhere. Found in moist places: in wet meadows, around sloughs, in depressional grassland, in moist open woods. Alkali and saline-tolerant, and often occurring on salty or alkali flats and depressions.

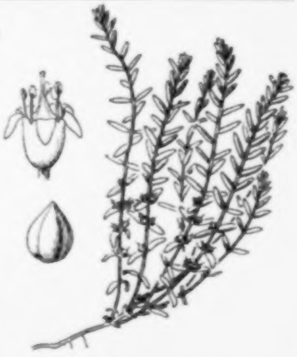
Forage Value: Poor, considered of little significance as range species.

Grazing Response: Increasers, although usually not persisting in abused, altered rangelands.

Notes: Syn. *D. radicatum*; derived from the Greek *dodeka*, twelve, and *theoi*, gods, the term applied by Pliny who saw the flower clusters as an assembly of Olympian gods; N. American Indians also called members of the genus Indian Chief; an edible plant, shooting star leaves were used as a pot herb or eaten raw, the roots were roasted, and the Blackfoot people made infusions of leaves to treat cankers and sore eyes; native shooting stars make attractive additions to both reclamation mixes and wild flower gardens, and can be grown readily by transplanting and also from seed.

GLAUX L. - Sea Milkwort

Glaux maritima L. - Sea Milkwort



Growth Habit:	**Small perennials** from slender, shallow rhizomes; **stems 5-15 cm. tall**, erect to spreading, **diffusely branched, pale-glaucous, succulent, glabrous**.
Blades:	**Leaves glabrous, cauline, opposite, numerous and little reduced upward, sessile, entire, succulent, pale-glaucous, dark glandular-dotted, 6-12 mm. long.**
Inflorescence:	**Flowers small, solitary in axils; petals absent, calyx cup-shaped, petal-like, white to pink, 4-5 mm. long**, with 5 ovate lobes; stamens 5, alternate calyx lobes, inserted at calyx base; **fruit an ovoid** valvate **capsule about 2.5 mm. long**; seeds few, flattened, about 1.5 mm. long.
Habitat & Distribution:	Frequent in prairie and parkland regions, and in a few locations northward. Grows on moist saline and alkaline flats, on shores, in depressional, marshy places; populations appear to be most prevalent on more stable and often more heavily vegetated sites than at the water's edge.
Forage Value:	Poor.
Grazing Response:	Increasers but not aggressive, also restricted by habitat requirements.
Notes:	Only one species in the genus; the generic name, a reference to glaucous or blue-green colored foliage, *maritima* translates of the sea, this because of its characteristic saline tolerance; the species is widely distributed across North America, found along inland saline shores as well as on coastal tidal flats.

LYSIMACHIA L. - Loosestrife

Common Characteristics

- Perennials (ours), often rhizomatous.
- Blades opposite, distributed along the stems.
- Flowers yellow, long-stalked, in pairs at nodes or in peduncled axillary racemes.
- Flower parts in 5's or 6's.
- Calyx deeply lobed, corolla mostly rotate, divided to near the base.

- Stamens equalling perianth divisions, distinct, staminodia sometimes present.
- Ovary mostly glabrous, with a slender style.
- Capsules nearly spherical, valvate.
- Seeds few, pitted.

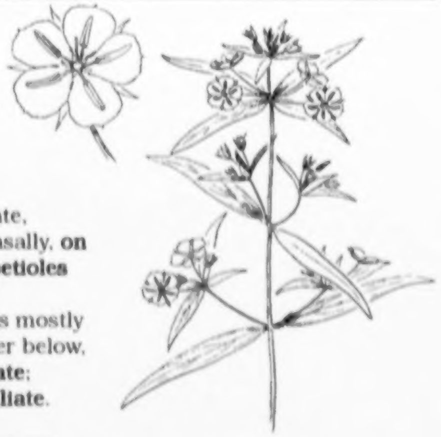
Key to Lysimachia

1.	Leaves narrowed but barely stalked at the base, glandular dotted; flowers in dense, stalked racemes in leaf axils; corolla with linear lobes.	*L. thyrsiflora*
	Leaves distinctly stalked, not glandular but with ciliate petioles; flowers few, long stalked in leaf axils; corolla with broader lobes.	*L. ciliata*

Key to Trientalis

1.	Reduced leaves not scale-like, green; main blades oblanceolate, obtuse-acutish.	*T. europaea*
	Reduced leaves scale-like; main blades lanceolate, long-pointed.	*T. borealis*

Lysimachia ciliata L. - Fringed Loosestrife



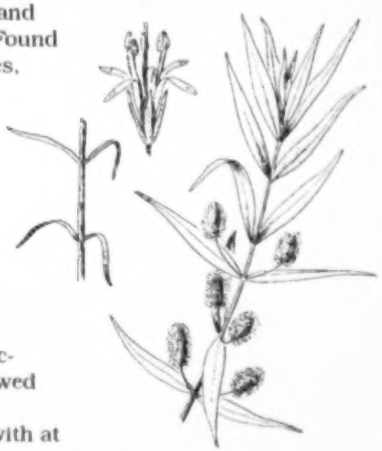
Growth Habit: **Plants from slender rhizomes**; stems mostly glabrous, 4-10 dm. tall, **sparsely red-dotted**.

Blades: **Blades 3-10 cm. long, ovate-lanceolate**, acuminate, rounded to subcordate basally, **on petioles 5-20 mm. long; petioles red-dotted and with long multicellular hairs**; blades mostly glabrous on surfaces, paler below, **distinctly short white-ciliate**; stipules ovate, leaf-like, **ciliate**.

Inflorescence: **Flowers mostly in axillary pairs**, on long filiform peduncles; **calyx mostly glabrous**, 5-cleft, firm, pointed; **corolla showy, about 15 mm. long, rotate, bright yellow, reddish-glandular**, especially toward the base; **apex fringe-toothed** and mostly cuspidate; staminodia present, minute; capsules ovoid.

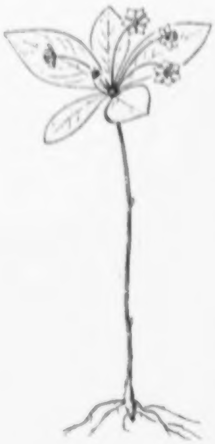
Similar Species:

1. ***Lysimachia thyrsiflora*** L. - Tufted Loosestrife
Most common in the parkland and boreal forest regions. Found in swampy and boggy places, on shores.
Differs as follows:
    - Stems red-purple-dotted, but also with brownish multicellular hairs.
    - Lower blades reduced and scale-like, the upper largest.
    - Blades narrowly elliptic-oblong to linear, narrowed to a subsessile base.
    - Blades not ciliate but with at least some brownish, multicellular hairs on both surfaces.
    - Leaves dark glandular-dotted on both surfaces.
    - Flowers in dense spike-like racemes in middle leaf axils.
    - Calyx smaller, with multicellular hairs and glandular dotted.
    - Corolla pale yellow, the lobes linear, usually purple-dotted near the apex.
    - Capsules purple-glandular dotted.

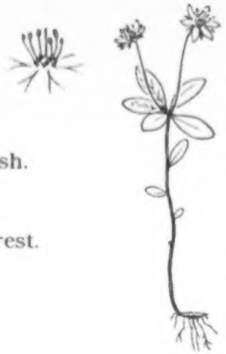


Other Species:

1. ***Trientalis borealis*** Raf. ssp. ***latifolia*** (Hook.) Hult. - Star-flower
Frequent in moist wooded/boggy places in the boreal forest.
Distinguished as follows:
    - Plants to 18 cm. tall, stems often finely glandular.
    - Leaves whorled at stem tips (5-9), lanceolate, pointed, to 10 cm. long.
    - Blades thin, often obscurely toothed, short stalked to sessile; reduced scale-like leaves present.
    - Petals white, 8-14 mm. long, long-pointed.
    - Capsules spherical, 5-valved, with a few seeds.



2. ***Trientalis europaea*** L. ssp. ***arctica*** (Fisch.) Hult. - Star-flower
Similar distribution patterns as *T. borealis*, also of moist places.
Differs from it:
- Leaves oblanceolate or obovate, to 6 cm. long, the apex only obtuse-acutish.
- Reduced leaves larger, not scale-like.



Habitat & Distribution: Frequent in all ecoregions except the boreal forest. Grows in moist, shaded areas, on shores.

Forage Value: Poor.

Grazing Response: Increasers, rather common in moist wooded areas but not troublesome in terms of out-competing valuable range plants, even under heavy grazing pressure.

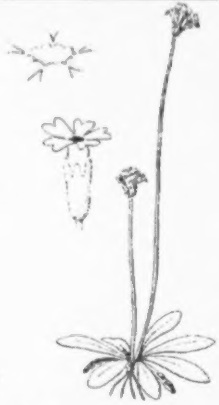
Notes: The name from *lysis*, loosening, and *mache*, battle or strife, this also alluded to by the common name, the original meaning unclear; loosestrifes make attractive garden ornamentals in moist shaded places, also are often pioneer plants along disturbed roadways and trails and play at least a minor role in stabilizing soil on these sites.

PRIMULA L. - Primrose

Common Characteristics

- Scapose herbs, mostly from fibrous roots.
- Blades in basal rosettes, petiolate or narrowed basally.
- Foliage in some species with a mealy powder.
- Flowers in terminal bracteate umbels, showy, the parts in fives.
- Calyx tubular, angled, persistent.
- Corolla pink to purple, salverform, the tube longer than the calyx.
- Corolla lobes spreading but not reflexed, notched or more deeply cleft.
- Stamens 5, attached to the upper part of corolla, separate, included.
- Style filiform, mostly included, stigma head-like.
- Ovary superior.
- Fruit an apically 5-valved capsule.

Primula incana M.E. Jones - Mealy Primrose



Growth Habit: Perennials from a caudex and fibrous roots; **scapes 1-4 dm. tall**, rather stout (1-2 mm. thick), stiff, **usually somewhat farinose**, especially toward apex.

Blades: **Leaves elliptic to oblong-obovate, shallowly toothed**, 3-6 cm. long, subsessile or narrowed to short winged petioles, **pale green and somewhat farinose below**.

Inflorescence: **Umbels head-like**, but often with some pedicels elongating to 2.5 cm. long in fruit; **bracts** linear-oblong to lanceolate, flat, 0.5-1 cm. long, **farinose**, swollen at base; calyx 11-14 mm. long, lobed (lobes ovate-oblong) about 1/3 of its length, **densely farinose; corolla 8-11 mm. long, lilac and yellow-based, the deeply bifid lobes 2-4 mm.** long; **capsules elliptical**, about equalling calyx; seeds strongly angled, 0.5-0.7 mm. long, reticulate.

Habitat & Distribution: Common in the parkland and boreal forest, with a few occurrences in the foothills region. Grows in depressional grassland, on shores, in marshy places, often in saline and alkaline soils and an indicator of salinity/alkalinity.

Forage Value: Poor, producing little forage and this in the form of basal rosettes that are below normal grazing level.

Grazing Response: Increasers but our species not intrusive.

Notes: From the Latin *primus*, early or first, as many species flower early in the season, the specific name means to turn grey or white, in reference to the mealy coating on the plants; a genus of about 200 species, many of these known for their beautiful flowers and widely grown as ornamentals; our native species have rather specific habitat requirements, and unless these are simulated, are often difficult to establish.

GENTIANACEAE - Gentian Family

Common Characteristics

- Blades mostly opposite, simple, entire.
- Flowers terminal and solitary, or in cymes in leaf axils.
- Flowers usually showy, perfect, regular.
- Calyx and corolla 4-5 lobed, the corolla tubular to saucer-shaped, sometimes with folds between the lobes.
- Stamens equalling corolla lobes and alternate them.
- Fruit a capsule (usually 2-valved).
- Seeds numerous, small, often pitted.
- Seeds often winged.

Key to Gentianaceae

1. Corolla 4-spurred at the base. *Halenia*

Corolla without basal spurs. 2

2. Corolla without plaits between lobes, the lobes 5-9-veined. *Gentianella*

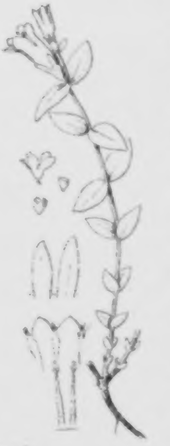
Corolla with folds/plaits between lobes, the lobes 3-veined. *Gentiana*

GENTIANA L. - Gentian

Common Characteristics

- Annual, biennial or perennial herbs from fleshy roots or rhizomes.
- Blades opposite, petiolate to sessile.
- Flowers 5-merous, solitary or in clusters.
- Corolla funnelform to salverform, the tube at least as long as the lobes.
- Corolla lobes 3-veined, with plaits or folds between the lobes, the throat not ciliate.
- Nectaries at the base of the ovary.
- Capsules stalked.
- Seeds often winged.

Gentiana affinis Griseb. - Prairie Gentian



Growth Habit: Perennials from deep fleshy-thickened roots, not rhizomatous; stems usually tufted, erect or decumbent at the base, glabrous or finely hairy in lines decurrent from leaf bases, **1-3 dm. tall**.

Blades: Basal rosettes **none at flowering time**, the cauline blades **oblong-lanceolate or ovate, acute, 1-4 cm. long**, in 6-12 pairs, rather **thick and succulent**, finely scabrous above, smooth below, often finely glandular-ciliate.

Inflorescence: Flowers rather few to several, racemose; calyx scabrous and often **blue-purple-tinged**, the lobes **acute**, unequal (from ovate to linear or nearly obsolete); corolla **bluish, 2-3 cm. long**, narrowly funnelform, the lobes **3-veined**, ovate, spreading, with **toothed plaits between them**; ovary long-stalked; seeds flattened, finely reticulate, wing-margined.

Habitat & Distribution: Occasional in all ecoregions except the boreal forest. Grows in moist, depressional sites in drier prairie regions, in low meadows, in open woods.

Forage Value: Poor, unpalatable due to bitter tasting foliage.

Grazing Response: An increaser #1, never very abundant and does not grow readily from seed, but plants withstand moderate grazing pressure once established.

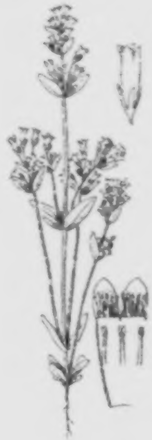
Notes: *G. affinis* was a familiar plant to the Blackfoot people, apparently of little use as a medicinal or food species, instead recognized primarily because of its spectacular flowers; most perennial gentians, although some of our most beautiful wild flowers, are difficult to establish from seed but can be successfully transplanted into moist gardens; locally, several species are rare, and for this reason are best not disturbed.

GENTIANELLA Moench - Gentian

Common Characteristics

- Taprooted annuals or biennials.
- Blades opposite, stalkless to nearly so.
- Flowers solitary to several, axillary or terminal, parts in 4's or 5's.
- Corolla funnel-shaped, the tube at least as long as lobes.
- Corolla lobes 5-9 veined, without plaits or folds between them but the throat hair-fringed.
- Capsule stalkless to stalked, seeds wingless.

Gentianella amarella (L.) Borner ssp. ***acuta*** (Michx.) Gillett - Northern Gentian; Felwort



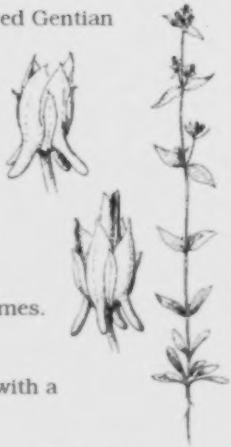
Growth Habit: **Taprooted annual or biennial, 0.5-5 dm. tall;** stems pale or red-tinged, **hairless**, **angled**, **simple or branched from below** with ascending branches.

Blades: **Basal blades smallest, oval-spatula-shaped, becoming narrower above; to 6 cm. long, stalkless and often clasping at the base**; blades rather thin, mostly hairless.

Inflorescence: Flowers **1-3 in axils or more numerous, in rather dense clusters**; calyx pale basally, green and often purple-tinged above, deeply cleft into lanceolate lobes, sometimes more deeply cleft on one side; corolla more or less **funnel-shaped, 10-15 mm. long**, the tube slender, **fringed at the throat**, the lobes **blunt to pointed, lobes each with more than 3 veins**; corolla from **violet to pale greenish-blue, occasionally white** in forma *michauxiana* (Fern) Scoggan; capsules **oval**, **stalkless**, somewhat exceeding the persistent corolla; seeds yellowish, nearly smooth.

Similar Species:

1. ***Halenia deflexa*** (Sm.) Griseb. - Spurred Gentian
   Most common in central boreal regions, occasional in foothills and montane areas. Found in moist woods. Distinguished as follows:
   - Annual or biennial, with leafy stems 1-5 dm. tall, these simple to branched.
   - Basal leaves oblanceolate-spatulate, stalked.
   - Cauline leaves lanceolate, subsessile.
   - Flowers in terminal and axillary racemes.
   - Calyx deeply divided, with 4 acuminate lobes.
   - Corolla purplish, 4-lobed, each lobe with a basal spur.



Habitat & Distribution:

Common in all regions except the prairies. Found from lowlands to subalpine elevations. Grows in moist meadows and grassland, in open woods and thickets, in disturbed places such as along roads and trails.

Forage Value:

Poor, this based on relatively low palatability due to a bitter flavor, although the tonic properties of the plants may actually be beneficial to grazing animals; the genus is generally rated of little value to cattle and horses, sometimes consumed by sheep and game in the absence of better forage.

Grazing Response:

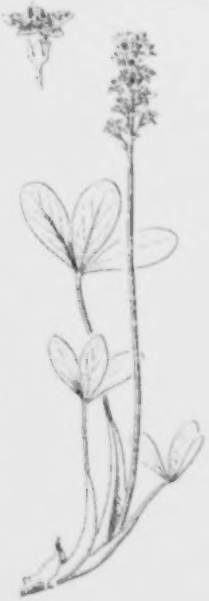
An increaser; as with many annuals, the species is adapted to produce an abundance of highly viable seed; as well, its characteristic late-season growth is a reproductive advantage as plenty of more attractive forage is usually available when gentians emerge.

Notes:

Syn. *Gentiana amarella*; named after King Gentiuns of Illyria who was thought to discover the medicinal properties of the genus; *amarella*, from the Latin *amarus*, bitter, in reference to the bitter alkaloid juices; also called annual gentian; the roots are long-acclaimed as a source of a medicinal tonic, used to treat malaria and other disorders, although consumption of large amounts apparently causes nausea; some species, rich in sugars, are fermented and distilled; *G. amarella* is an important early successional forb for reclamation purposes, and is currently in preliminary developmental stages.

MENYANTHACEAE - Buck-bean Family
MENYANTHES L. - Buck-bean

Menyanthes trifoliata L. - Buck-bean



Growth Habit: **Perennial with stout, woody, scaly creeping rhizomes**; stems glabrous, scape-like, 1-3 dm. tall.

Blades: **Blades alternate but appearing basal, 3-divided into glabrous entire oval-elliptic leaflets 3-10 cm. long; petioles long** (10-30 cm.), **their bases with conspicuous, enlarged membranous to greenish, veiny stipules.**

Inflorescence: Racemes terminal, the flowers bracteate-based and on pedicels 5-20 mm. long; calyx deeply 5-divided, the lobes obtuse; corolla deeply 5-divided, the lobes much longer than the tube, **10-15 mm. long, white and often purple-tinged; inner surface of corolla densely covered with slender scales**; stamens 5, attached to corolla tube; style 1, with a 2-lobed stigma; flowers dimorphic, with some having exserted stamens and included styles, others with exserted styles and included stamens; ovary partially inferior, 1-loculed; **fruit an ovoid capsule 6-10 mm. long**; capsules essentially indehiscent, rupturing irregularly; seeds smooth, shining, light brownish, to 2.5 mm. long.

Habitat & Distribution: Frequent in all ecoregions except the prairies and parkland. Found in wet, swampy places, on the edge of lakes and ponds, and especially in fens or "floating bogs". An indicator of somewhat improved soil nutrients as compared to true bog ecosites.

Forage Value: Poor for livestock, sometimes grazed by game, although often seasonally unavailable due to its wetland environment.

Grazing Response: An increaser but with rather specific and restricted habitat requirements which prevents invasion onto upland sites.

Notes: *Menyanthes*, from the Greek *menanthos*, moon-flower, the specific name because of the 3 leaflets; the species has been used for a number of medicinal purposes, the fresh foliage strongly emetic, but when dried can be taken as a tonic, cathartic, diuretic, and to promote good digestion; nutritional value is considerable, rating high in vitamin C, iodine and iron; buckbean probably rates among our most successful soil binding species, creating a network of rhizomes that weaves throughout wetland environments, decaying plant material contributing as well to the building of organic soils.

APOCYNACEAE - Dogbane Family
APOCYNUM L. - Dogbane; Indian Hemp

Common Characteristics

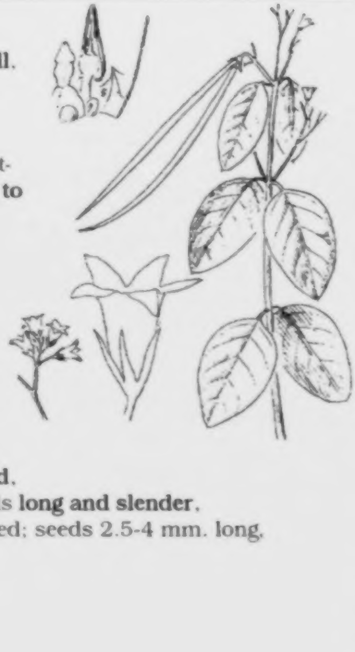
- Rhizomatous perennial herbs with tough but not woody stems and milky juice.
- Leaves entire, opposite.
- Inflorescence in cymes, sometimes compound.
- Calyx 5-lobed, corolla tube or bell-shaped, 5-lobed.
- Fruit of long, slender, rounded pods.
- Seeds numerous, rounded, with a tuft of silky hairs at the top.

Key to Apocynum

1. Leaves ascending; corolla with ascending lobes, greenish white, less than twice as long as calyx; seeds 4-6 mm. long. *A. cannabinum*

Leaves spreading to drooping; corolla with spreading-recurved lobes, pink, twice as long as calyx; seeds 4 mm. long or less. *A. androsaemifolium*

Apocynum androsaemifolium L. - Spreading Dogbane



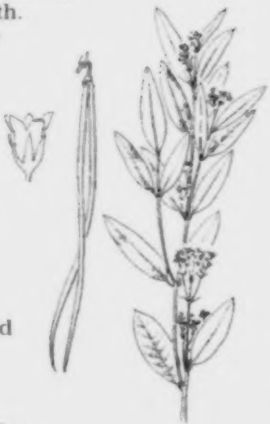
Growth Habit: **Rhizomatous perennials**; stems **tough but not woody, 2-10 dm. tall**, hairless or sparsely hairy above, branched upward, **juice milky**.

Blades: Leaves **oblong-ovate**, the top short-pointed, short stalked, **spreading to drooping**; upper surface green, hairless, the lower surface paler and often short-hairy.

Inflorescence: Cymes **axillary and terminal, the clusters all flowering simultaneously; calyx about 1/2 as long as corolla**, the lobes ovate-lanceolate; corolla **pink**, fragrant, **cup-shaped, 5-10 mm. long, the lobes recurved**, about 1/2 as long as the tube; pods **long and slender**, 7-12 (14) cm. long, erect to reflexed; seeds 2.5-4 mm. long, **with off-white tuft of hairs**.

Similar Species:

1. ***Apocynum cannabinum*** L. - Indian Hemp
   Occasional, most common in the south. Found in moist woods, and especially common on river shores.
   Differs as follows:
   - Blades ascending, more oblong/narrower.
   - Flowers greenish-white.
   - Corolla less than twice as long as the calyx, the lobes ascending.
   - Seeds larger (4-6 mm. long).



Habitat & Distribution:

Frequent throughout most regions, although uncommon in the prairies. Found in sandy places, in dry woods, on open slopes and banks.

Forage Value:

Poor, rated as unpalatable and worthless for cattle and game, occasionally used by sheep, the foliage also considered mildly toxic when large quantities are consumed.

Grazing Response:

An increaser, spreading on exposed soil and overgrazed range.

Notes:

The Latinized form of the Greek *apokunon* (*apo*, from, *kunon*, dogs), both this and the common name because the plants were thought to repel dogs; the specific name is a reference to a member of the St.johnswort family, sweet amber, which has similar leaves; also known as Indian or Canadian hemp; spreading dogbane was a widely used medicinal plant (although taken in large quantities it can be toxic); roots of dogbane species are a source of a cardiac stimulant and diuretic, also used for kidney ailments, asthma, rheumatism, arthritis, constipation, fever, to cure insomnia, and infusions used to expel pinworms and threadworms, and to prevent falling hair; the fibrous bark of dogbane was a source of cordage for aboriginal people, *A. cannabinum* especially valued for this purpose; *Apocynum* species apparently produce honey of superior quality, and because of an extended flowering season, are available when most other species have completed flowering; both *A. androsaemifolium* and *A. cannabinum* have potential in reclaiming disturbances, the rhizomes effective in binding soil, the former species useful on exposed slopes, the latter best suited for sandy river shores. *Note*: *A.* x *medium* Greene is a common hybrid between the two given species, with intermediate characteristics and flowers often abortive.

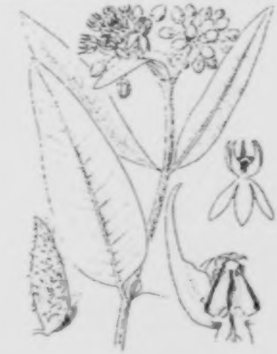
ASCLEPIADACEAE - Milkweed Family

Common Characteristics

- Perennial herbs from rhizomes or thickened, fleshy roots.
- Stems and leaves with milky juice.
- Leaves usually opposite, without stipules or with small, early deciduous stipules.
- Flowers in umbels.
- Calyx and corolla each 5-lobed.
- Stamens 5, united into a tube.
- Attached to stamen column are 5 "hoods" (corona) or horned appendages, these alternate the corolla lobes.
- Pollen grains are united into pollinia (masses) and are attached in pairs, these (of adjacent anthers) joined by an appendage; this is attached to a gland near the stigma lobe, and glands adhere to visiting insects, smaller insects often becoming trapped, larger ones effective in removing the pollinia and ensuring cross-pollination.
- Fruit of 2 (1 often abortive) follicles, these ovoid to elongate-spindle-shaped, relatively large, opening on one side.
- Seeds flattened, margined, with silky hairs at the top.

ASCLEPIAS L. - Milkweed

Asclepias speciosa Torr. - Showy Milkweed



Growth Habit: Plants **from extensive rhizomes, often forming large patches**; stems **0.5-2 m. tall**, stout, **greyish-velvety hairy to hairless below**.

Blades: Leaves **large, short-stalked, lanceolate to ovate or oblong, 10-20 cm. long and about 1/2 as broad**, the base **round-subcordate**, the top short-pointed, **often wavy margined**; blades **light green, velvety-hairy, often sparsely so above**.

Inflorescence: **Umbels usually several, large, round, the flower stalks velvety**; sepals red-tinged, velvety; flowers **large, over 1 cm. long, pink-purple**, the hoods with incurved horns; follicles 7-11 cm. long, **narrowly ovoid, with soft tubercles, white-hairy**; seeds wrinkled, to 8 mm. long, with silky hairs at the tips.

Habitat & Distribution: Common in the prairie region. Found in rather moist locations: around lakes, along streams and irrigation canals, in ditches.

Forage Value: Poor, containing toxic glycosides and when consumed in sufficient quantities, causes spasms and often death from respiratory paralysis; the entire plant is poisonous, the leaves most toxic, and highest levels of glycosides present just prior to flowering (the poisonous principle is not volatile upon drying, thus hay containing milkweed is potentially dangerous); fortunately, members of the genus are unpalatable, utilized only when all other forage is depleted.

Grazing Response: An increaser; seldom grazed, also spreads readily by rhizomes, and produces an abundance of seed that is readily air or water borne; as well, the special adaptations that ensure cross-pollination give a reproductive advantage.

Notes: Named for Asklepios, the Greek god of medicine, *speciosa* means showy, the common name alluding to the milky juice characteristic of the family; despite its toxicity, milkweed has claimed a place among medicinal plants (apparently cooked foliage is edible, as are the roots, although this is not advised); the latex was used to treat skin problems (warts, ringworm, calluses, cuts), also small amounts of root decoctions were taken internally for kidney problems, gonorrhea, asthma, indigestion, and root tea supposedly used to increase lactation and as a temporary contraceptive; a solution of seeds was apparently effective in drawing out rattlesnake poison; some native people used the silk from pods to weave fabric, and to stuff pillows and beds; milkweed is probably best known as the plant upon which the monarch butterfly is entirely dependent for survival; this butterfly, famous for its migratory lifestyle, retains sufficient quantities of toxic glycosides (ingested by larvae) to be distasteful to birds; *A. speciosa* is effective in stabilizing disturbed soil along waterways, and is easily propagated by both seed and rhizome sprigs.

POLEMONIACEAE - Phlox Family

Common Characteristics

- Annual to perennial herbs, roots various.
- Leaves various: simple to divided, alternate or opposite.
- Flowers usually in cymes, occasionally solitary.
- Flowers perfect, regular, the calyx and corolla each 5-lobed, the corolla often with a long tube and flattened end (salverform) to funnel-shaped.
- Stamens 5, alternate corolla lobes.
- Fruit a capsule, of few-many seeds.

Key to Polemoniaceae

1. Leaves divided. *Polemonium*

Leaves simple, entire. 2

2. Annuals, leaves mostly alternate; calyx enlarging and covering capsule; weedy natives. *Collomia*

Low growing perennials, forming extensive mats; leaves mostly opposite; of dry prairie/parkland sites. *Phlox*

PHLOX L. - Phlox

Common Characteristics

- Low, tufted, mat forming perennials from taproots.
- Leaves opposite, entire, simple, firm, narrow, sharp-pointed.
- Flowers few (1) to several, terminating leafy branches.
- Sepals glandular-hairy or with cobwebby hairs, a pale margin uniting them below.
- Flowers small but showy, white-blue, salverform.
- Capsules not exserted from calyx, narrowly oval, 3-valved, with few seeds.

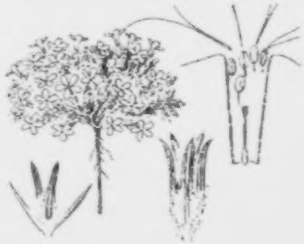
Key to Phlox

1. Leaves linear-oblong, 2-4 mm. wide, ciliate, without cobwebby hairs; corolla 15-18 mm. long. *P. alyssifolia*

Leaves awl-shaped, less than 2 mm. wide, not ciliate but with cobwebby hairs; corolla to 10 mm. long. *P. hoodii*

Phlox hoodii Richards. - Moss Phlox

Growth Habit: Plants from woody taproots, **densely tufted and mat-forming**; branches numerous from base and branching crown, **averaging 3-6 cm. long**.

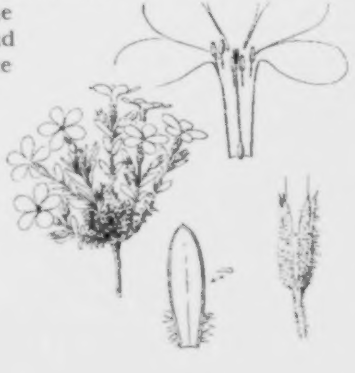


Blades: Blades **awl-shaped, 4-10 mm. long, to 1 mm. wide, cobwebby-hairy**, the margins white-thickened, rolled with age.

Inflorescence: Flowers often solitary, nearly stalkless; calyx **cobwebby-hairy**, the membranes joining lobes below flat, the lobes firm, narrow, with thickened margins, **not glandular**; corolla **with a long tube and flattened end, white or blue-tinged, 8-10 mm. long**; capsules small, narrowly oval.

Similar Species:

1. ***Phlox alyssifolia*** Greene - Blue Phlox
Less common, restricted to the southern Rocky Mountains and ranging eastward to confluence of the Bow and Old Man Rivers, found on dry slopes and on exposed rocky and gravelly places.



Differs as follows:

- Leaves longer (10-18 mm.) and broader (2-4 mm.), often hair-fringed on margins.
- Hairs of stems, leaves and calyx not cobwebby, but multicellular, also glandular upward.
- Calyx glandular-hairy.
- Flowers larger, 15-20 mm. long, white or more often pale blue.

Habitat & Distribution: Common in the south, found in all ecoregions represented. Grows in dry prairie grassland, on open, exposed hillsides and dry slopes.

Forage Value: Poor, producing little forage, and this stiff and unpalatable and below normal grazing level.

Grazing Response: Increasers, the woody taproots and low growth giving the species an advantage in dry and overgrazed conditions.

Notes: *Phlox* is the Greek word for flame, describing the brightly colored flowers of some species; although rather inconspicuous, both *P. hoodii* and *P. alyssifolia* (especially those with blue or pink-tinged flowers) are attractive in arid gardens; as well, their matted growth form is effective in both providing cover and binding soil on exposed, erodable slopes.

POLEMONIUM L. - Jacob's-ladder

Common Characteristics

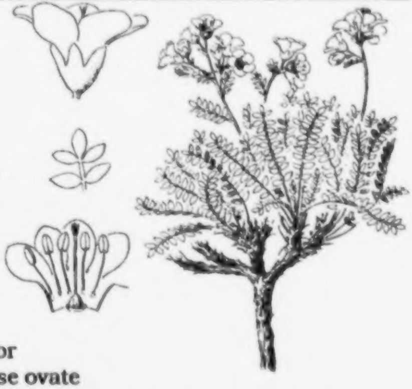
- Perennials from horizontal or ascending rootstocks or taproots.
- Plants glandular-pubescent, at least above and in the inflorescence.
- Blades alternate, pinnate, the leaflets entire to cleft and appearing in whorls.
- Inflorescence cymose, sometimes subcapitate.
- Calyx herbaceous, cup-shaped, enlarging in fruit.
- Flowers blue, showy, funnel-shaped or salverform to rotate, mostly longer or wider than 1 cm.
- Stamens nearly equally inserted, the filaments declined, often hairy basally.
- Styles elongate, 3-lobed.
- Ovules 3-several per locule.
- Capsules 3-valved, with black spindle-shaped seeds.

Key to Polemonium

1. Stems tufted, more than one, to 3 dm. tall; petals glabrous; plants of mesic to dry habitats. *P. pulcherrimum*

Stems solitary, 4-10 dm. tall; petals hairy; plants of wet habitats. *P. acutiflorum*

Polemonium pulcherrimum Hook. - Jacob's-ladder



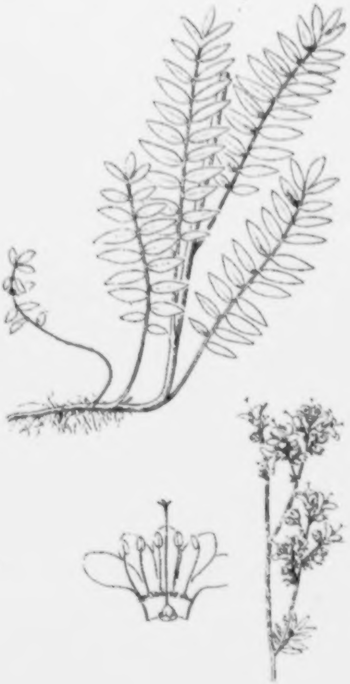
Growth Habit: Perennials from branched caudices (these sometimes elongate or rhizome-like) that usually surmount a taproot; **stems usually several, sparingly branched, 0.3-3 dm. tall**, glandular pubescent, at least above.

Blades: Basal blades well developed, often tufted, the cauline reduced; **blades with 11-23 opposite or somewhat offset pinnae, these ovate to orbicular, to 8 mm. long**, entire, the apex pointed; **leaflets and rachis glandular-hairy; plants with a strong skunk-like odor.**

Inflorescence: Cymes with long slender pedicels, the inflorescence somewhat congested but not capitate; calyx glandular-hairy, 4-6 mm. long at maturity, the lobes acute; **corolla blue and often with a yellow tube, 5-8 mm. long, glabrous, bell-shaped**, the lobes equal to or longer than the tube, rounded at the apex; **style and stamens nearly equal to corolla**.

Similar Species:

1. ***Polemonium acutiflorum*** Willd. - Jacob's-ladder
   Frequent in the boreal forest, occasional in the foothills. Restricted to moist areas, marshy places, fens, moist open thickets.
   Differs as follows:
   - Stems solitary, from horizontal rhizomes.
   - Stems taller, 3-10 dm. tall.
   - Leaflets 15-27, larger (to about 15 mm. long), elliptic-lanceolate, acute.
   - Inflorescence a corymbose cyme, loose.
   - Flowers larger (to 18 mm. long), blue.
   - Petals with pointed lobes, finely pubescent.
   - Styles exserted.



Other Species:

1. ***Collomia linearis*** Nutt. - Collomia
An annual, found in moist, usually disturbed places, common in all ecoregions.
Distinguished as follows:
   - Simple to branched annuals, 1-4 dm. tall.
   - Blades 2-5 cm. long, linear-lanceolate, entire, alternate, forming a cluster beneath flower heads.
   - Flowers 10-15 mm. long, trumpet-shaped, pink, inconspicuous.
   - Calyx enlarging at maturity and covering capsules.

Habitat & Distribution: Confined to the foothills and Rocky Mountain regions. Found on dry exposed slopes, on rocky alpine ridges, often in sandy or gravelly soil.

Forage Value: Poor to fair, providing some quantities of forage when plentiful, sometimes eaten by sheep and game early in the season before the foliage dries out.

Grazing Response: Increasers.

Notes: From the Greek *polemos*, war, some species apparently causing a war between two kings who each wanted to be credited with the discovery of its medicinal properties; ironically, no such medical uses of the genus are known today; the family contains many familiar horticultural species, our natives no exception in terms of ornamental potential, although most are malodorous (hence the common name) and are not pleasant in confined places. *Note: Collomia linearis*, unlike both the aggressive introduced annuals and also the rather numerous diminutive rare annual species, is an important early successional plant on disturbances, but does not persist once vegetation cover has been re-established.

HYDROPHYLLACEAE - Waterleaf Family

Common Characteristics

- Annual to perennial herbs, roots various.
- Leaves alternate (rarely basal or opposite), exstipulate, simple to pinnatifid.
- Flowers perfect, mostly regular, gamopetalous, 5-merous.
- Flowers in cymes, or less commonly solitary in axils.
- Sepals often with appendages in sinuses.
- Corolla cup or funnel-shaped, often appendaged within, of 5 united petals.
- Stamens 5, inserted near the base of the corolla and alternate its lobes.
- Ovary superior, mostly 2-carpellary and 1-loculed with 2 parietal placentae, sometimes 2-loculed.
- Styles usually 2-cleft, with capitate stigmas.
- Fruit a 2-valved capsule.
- Seeds few-many, often pitted or reticulate.

PHACELIA Juss. - Scorpion Weed

Common Characteristics

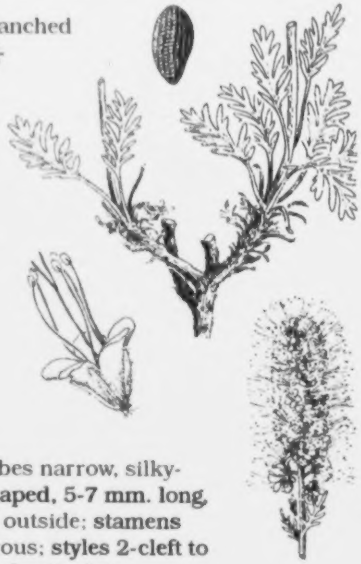
- Taprooted annual to perennial herbs.
- Blades alternate (or opposite below), entire to pinnately divided.
- Flowers mostly in elongate 1-sided racemes or spike-like cymes.
- Calyx 5-divided to near the base, often with accrescent lobes.
- Corolla often showy, white, blue or purple, 5-lobed, often with plaits between the lobes.
- Stamens 5, often exserted.
- Styles 2-cleft.
- Capsule with placentae at least partially intruded.
- Seeds reticulate, roughened.

Key to Phacelia

1. Perennials to 4 dm. tall; stamens very conspicuously exserted; Rocky Mountain species. *P. sericea*

Biennials/winter annuals to 5 dm. tall; stamens only barely exserted; more widespread, Rocky Mountains/boreal. *P. franklinii*

Phacelia sericea (Graham) A. Gray - Scorpion Weed



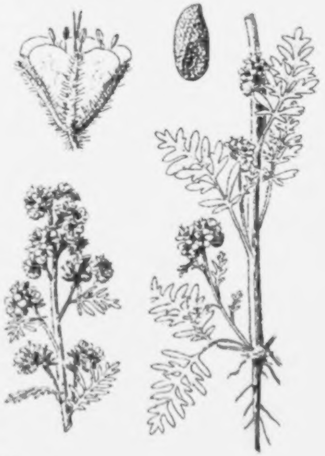
Growth Habit: Perennials from a taproot and branched caudex; stems several, ascending-erect, **1-4 dm. tall**, sericeous to more or less woolly, often somewhat glandular.

Blades: **Blades pinnately (bipinnately) divided to midrib into numerous linear-oblong, entire to cleft lobes**; basal and lower cauline leaves petioled, larger, becoming subsessile and reduced above; **blades silvery-silky pubescent and sparsely glandular, grey-green.**

Inflorescence: **Cymes spike-like, dense, elongating to 2 dm. long**; calyx lobes narrow, silky-pubescent; **corolla showy, bell-shaped, 5-7 mm. long, blue-violet,** pubescent inside and outside; **stamens long-exserted**, the filaments glabrous; **styles 2-cleft to near the middle**; seeds 8-18, pitted-reticulate.

Similar Species:

1. ***Phacelia franklinii*** (R. BR.) A. Gray - Scorpion Weed
   Occasional throughout most ecoregions, absent from prairie/parkland areas. Found in open, usually disturbed sites.
   Distinguished as follows:
   - Biennials/winter annuals with erect, hairy stems to 5 dm. tall.
   - Lowest blades stalked, pinnately divided, the ultimate lobes triangular-narrowly oblong, often toothed, hairy.
   - Cauline leaves less divided, sessile.
   - Flowers 5-9 mm. long, pale blue, in congested clusters.
   - Stamens only slightly exserted.



Habitat & Distribution: Frequent in the foothills and Rocky Mountain region. Grows in open woods, on rocky ledges and slopes, often in open disturbed ditches and along trails.

Forage Value: Poor.

Grazing Response: An increaser in its adapted range, preferring shallow, exposed soil and not competitive in heavily vegetated areas.

Notes: From the Greek *phakelos*, cluster, in reference to the typical arrangement of flowers; about 150 species in the genus, many common in western North America; *P. sericea* is renowned for its beauty, growing readily from both seed and root cuttings, also is recommended as an early successional forb on disturbed shales and gravelly sites in western regions; *P. franklinii* is a promising short lived species for revegetating disturbances, behaving naturally as a pioneer plant with a rather wide geographical distribution.

BORAGINACEAE - Borage Family

Common Characteristics

- Herbaceous annuals to perennials, roots various.
- Leaves mostly alternate, mostly entire.
- Hairs often rough.
- Inflorescence in cymes, but often elongating and appearing as racemes or spikes.
- Flowers perfect, regular, the calyx and corolla each 5-parted.

- Corolla often salverform, and sometimes with 5 appendages in throat alternating with the 5 stamens, these mostly included.
- Ovary 4-lobed.
- Fruit of 4 nutlets, these each 1 seeded.

Key to Boraginaceae

1. Hooked prickles present on nutlets. 2

   Hooked prickles on nutlets absent. 4

2. Entire surface of nutlets prickly. *Cynoglossum*

   Prickles confined to margins of nutlets. 3

3. Inflorescence mostly without bracts; pedicels reflexed in fruit. *Hackelia*

   Inflorescence with bracts; pedicels erect to ascending in fruit; weedy. *Lappula*

4. Cymes leafy. 5

   Cymes without well developed leaves, some with small bracts. 6

5. Corolla with rounded, sometimes jagged lobes, yellow-orange; styles not exserted. *Lithospermum*

   Corolla with pointed lobes, greenish-white; styles long exserted. *Onosmodium*

6. Bracts mostly present throughout the inflorescence. 7

   Bracts absent or only present at base of inflorescence. 8

7. Corolla blue; some stamens long-exserted; introduced, weedy. *Echium*

   Corolla white; stamens included; native, of dry sites. *Cryptantha*

8. Flowers white. 9

   Flowers blue. 10

9. Nutlets with a keel but no groove on ventral surface; diminutive plants of wet habitats. *Plagiobothrys*

   Nutlets with ventral groove; plants of dry places. *Cryptantha*

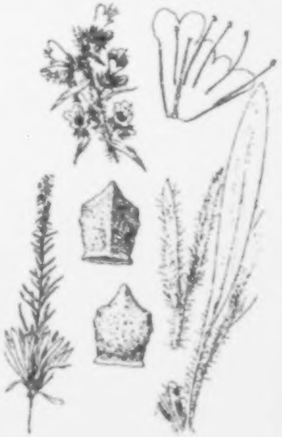
10. Corolla rotate-salverform, mostly less than 1 cm. long; inflorescence loose; Rocky Mountain species. *Myostis*

    Corolla tubular-funnelform, at least 1 cm. long; inflorescence usually more dense and congested; widespread. *Mertensia*

ECHIUM L. - Viper's-bugloss

Echium vulgare L. - Viper's-bugloss; Blue Devil; Blueweed

Growth Habit: **Biennials from black taproots**; stems **2-8 dm. tall**, stout, **covered with fine, short hairs and longer, stiff, bristly, swollen-based hairs.**

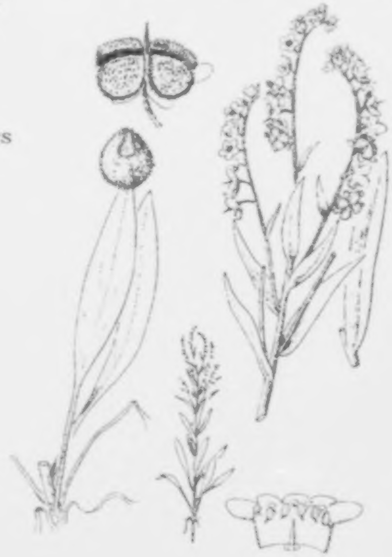


Blades: Basal leaves (and those of first year rosettes) **oblanceolate, 6-25 cm. long** (including stalks), entire; upper blades alternate, progressively smaller, nearly stalkless; blades **with long, white rough hairs below**, the upper surface **similar but hairs somewhat rougher** and more blister-based.

Inflorescence: Flowers in non-leafy but distinctly bracteate cymes, these elongating in fruit; flowers on short, erect stalks, on the upper side of branches; calyx deeply cleft into linear lobes; **bracts, calyx and stalks with stiff, bristly blister-based hairs**; corolla **showy, bright blue, 15-20 mm. long, tubular to funnel-shaped, the 5 lobes unequal**; stamens unequal, **4 long-exserted, the fifth shorter**; styles hairy, 2-cleft at the top; nutlets **not prickly, but roughened**, pointed at the top, one side rounded, the other angular and with a median ridge.

Similar Species:

1. ***Cynoglossum officinale*** L. - Hound's-tongue
   Also introduced, with much the same habitat and distribution as the preceding species.
   Distinguished as follows:
   - Taprooted biennial 4-8 dm. tall.
   - Foliage rather soft white-hairy.
   - Stems leafy, the blades lanceolate-oblong, long (1-3 dm.), roughened above.
   - Corolla funnel-shaped, 5-8 mm. long, showy, red-purple.
   - Nutlets densely covered with hooked prickles.



Habitat & Distribution: An introduced weed, becoming abundant in some areas in the foothills region. Found on disturbed sites, along roads, especially common in gravelly and rocky places.

Forage Value: Poor, the bristly foliage avoided by livestock at all stages of growth.

Grazing Response: An invader, European in origin; although short-lived, *E. vulgare* produces an abundance of viable seed and is aggressive on shallow and disturbed soil and on abused rangeland in the southern Rocky Mountains; as with other biennial species, effective control combines both clipping or mowing, and chemical application.

Notes: From the Greek, *echion*, used for other members of the family, this word derived from *echis*, viper; *vulgare* translates common. *Note: Cynoglossum officinale*, also native to Europe and established in the southern Rocky Mountain region, is a potential problem weed on exposed soil in abused rangelands, although it is generally less common and less persistent.

HACKELIA Opiz - Stick-seed

Common Characteristics

- Biennials or perennials with taproots.
- Stems tall, erect (to 10 dm.).
- Pubescence rough.
- Leaves linear-lanceolate, alternate, mostly cauline, reduced upwards.
- Flowers in (false) racemes, each basally bracteate, but otherwise mostly ebracteate.
- Flower pedicels deflexed in fruit.
- Flowers pale-dark blue, often yellow-based, salverform, small but sometimes over 2 mm. broad.
- Nutlets 4, exceeding style, attached by a scar to a low gynobase.
- Nutlets with hooked prickles along the dorsal marginal ridge and sometimes with a few smaller prickles on the back, this with or without a keel.

Key to Hackelia

1. Cauline leaves lanceolate/elliptic-oblong, pointed at both ends; corolla pale, about 2 mm. wide; marginal nutlet prickles not strongly flattened. *H. americana*

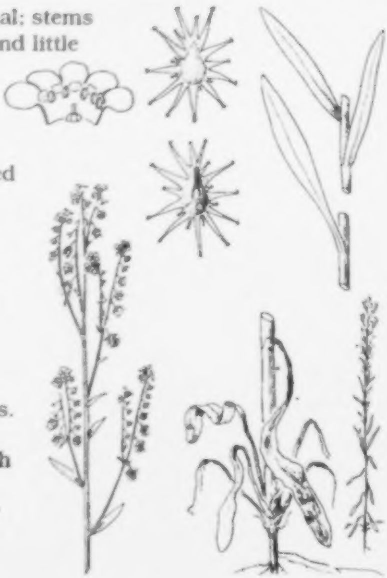
   Cauline leaves linear-oblong, broadest toward base; corolla 4-8 mm. wide; marginal nutlet prickles distinctly flattened. 2

2. Style about the length of sepals; nutlets not keeled but spiny on back; Rocky Mountain species. *H. jessicae*

   Style much shorter than sepals; nutlets keeled but not spiny on back; more widely distributed. *H. floribunda*

Hackelia floribunda (Lehm.) I. M. Johnston - Stick-seed

Growth Habit: Biennial to short-lived perennial; stems 3-10 dm. tall, solitary or few and little branched, hairy.



Blades: **Cauline blades well developed**, broad at base, **oblanceolate** and with margined petioles **(lowest) to narrowly oblong-lanceolate** and short stalked **(upper); largest blades 4-20 cm. long; basal blades usually withered by flowering time**, similar to lower cauline or somewhat smaller; leaves green to sparsely hairy on both surfaces.

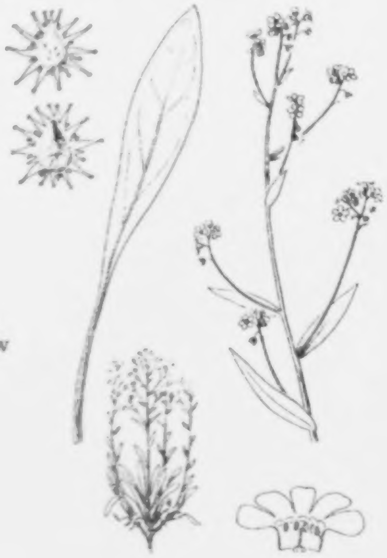
Inflorescence: Racemes elongate, narrow, **with bracts at base only**, the branches ascending but **flower pedicels pointing down (deflexed); flowers 5-8 mm. wide, pale to medium blue; styles distinctly shorter than sepals**; nutlets with marginal row of prickles much flattened; **backs of nutlets keeled, without small prickles**.

Similar Species:

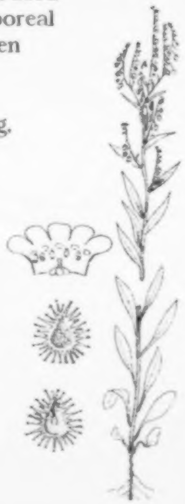
1. ***Hackelia jessicae*** (McGreg.) Brand - Stick-seed

   Found in similar habitats but more confined to montane areas in the Rocky Mountains. Differs as follows:

   - Basal leaves usually developed, larger than cauline leaves, and persistent.
   - Styles longer, about equal to sepals.
   - Nutlets not keeled on the back but with a few small prickles.



2. ***Hackelia americana*** (A. Gray) Fern. - Stick-seed
Occasional throughout all regions except the boreal forest. Grows in rich thickets and in moist open wooded areas.
Differs as follows:
- Cauline leaves lanceolate or elliptic-oblong, pointed at both ends.
- Flowers smaller, 1.5-2 mm. broad, pale blue to white.
- Nutlets smaller (dorsal area 2-3 mm. long).
- Prickles on nutlets only slightly flattened.



Habitat & Distribution: Frequent in the foothills and Rocky Mountain region, and in a few scattered locations eastward. Also found in Cypress Hills. Grows in rather moist, rich places: in open woods and shrubby thickets, in moist draws, snow melt areas, in lush meadows.

Forage Value: Poor, seldom grazed except in the event that rangelands have become deficient in better quality species; low palatability is, at least in part, due to the rough-hairy foliage and prickly fruits.

Grazing Response: Increasers, *Hackelia* species having a tendency to spread as climax species decline in response to overgrazing.

Notes: Named in honor of Joseph Hackel, a Czech botanist; *floribunda*, a reference to the abundance of flowers produced; as the common name suggests, members of the genus have developed an efficient system to ensure seed dispersal; hackelias are rather widely distributed, some of the smaller, more attractive species suitable for use in sunny gardens.

LAPPULA Moench - Blue-bur; Stick-tights

Common Characteristics

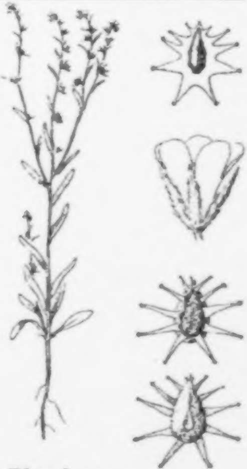
- Annuals or winter annuals from taproots.
- Blades narrow (linear-oblong) and entire.
- Flowers in bracted racemes.
- Stalks erect.
- Flowers small, 3-4 mm. wide.
- Calyx cleft to near base, only slightly enlarged in fruit.
- Flowers white-blue, salverform.
- Nutlets 4.
- Nutlets armed with 1-2 rows of prickles along margins.

Key to Lappula

1. Corolla 2-3 mm. broad, pale blue; marginal prickles on nutlets in 1 row. *L. occidentalis*

   Corolla 3-4 mm. broad, darker blue; marginal prickles on nutlets in 2 rows. *L. squarrosa*

Lappula occidentalis (S. Wats.) Greene - Western Blue-bur



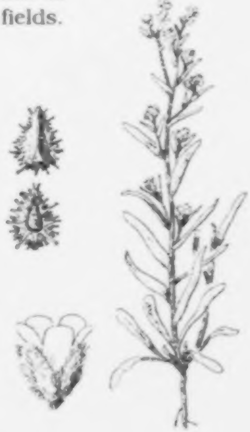
Growth Habit: **Annuals or winter annuals (biennials)** from slender taproots; stems **0.5-6 dm. tall**, simple to branched, **with rather rough white hairs**.

Blades: Leaves **numerous** (alternate), **to 6 cm. long**, the **lower oblanceolate**, often early deciduous; cauline blades becoming **smaller and linear-oblong**, transitional to the lanceolate bracts; blades **coarse-hairy with blister-based hairs**.

Inflorescence: Corolla **pale blue, 2-4 mm. broad**, barely surpassing the calyx; **marginal prickles of nutlets in 1 row, flattened**, the bases swollen and often joined to form a border.

Similar Species:

1. ***Lappula squarrosa*** (Retz.) Dumort. - Blue-bur
   An introduced and common species, found in waste places, along roads, in cultivated fields. Differs as follows:
   - Plants slightly larger and more robust.
   - Leaves somewhat longer.
   - Flowers darker blue, somewhat surpassing the calyx, 3-4 mm. broad.
   - Nutlets with marginal prickles not confluent at the base but in 2 rows, the outer shorter.

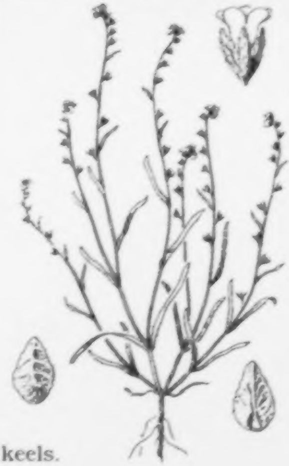


Other Species:

1. ***Plagiobothrys scouleri*** (H. & A.) Johnston - Plagiobothrys

A very small annual, often forming extensive and sometimes exclusive mats in saline depressions, in moist sandy areas. Restricted to the prairie and parkland regions. Distinguished as follows:

- Low, much branched annuals, spreading, stems 5-20 cm. long.
- Leaves 1-4 cm. long, linear, the lowest opposite.
- Foliage pubescent.
- Flowers with bracts, in one-sided racemes.
- Calyx 2-4 mm. long, petals white, 1.5 mm. long, salverform.
- Nutlets with dorsal and ventral keels.



Habitat & Distribution: Native, scattered throughout most regions, absent from portions of the northern boreal forest. Usually weedy in nature, found in waste and disturbed places, in cultivated fields.

Forage Value: Poor, the stiff, bristly foliage unpalatable.

Grazing Response: An increaser, (*L. squarrosa* an Eurasian invader); the bur-like seed is especially adapted for dispersal by sticking to fur and clothing, also highly viable and capable of remaining dormant for an extended time in the soil; although quickly establishing in disturbed places, our blue-bur species generally do not persist in rangeland unless it is in poor condition.

Notes: *Lappula*, from the Latin *lappa*, bur, *occidentalis* translates western; blue-bur is effective in providing cover and preventing erosion while climax species become established, dying back and rarely troublesome once revegetation is complete.

LITHOSPERMUM L. - Puccoon; Gromwell; Stoneseed

Common Characteristics

- Perennials from thick, red-brown taproots.
- Stems and leaves rough-coarse-hairy.
- Leaves alternate, linear-lanceolate.
- Flowers in spike-like cymes, these with conspicuous leafy bracts.
- Flowers pale to deep yellow, funnel-shaped to salverform, with rounded and sometimes jagged-fringed lobes.
- Stamens (5) and style included.
- Nutlets without prickles.
- Nutlets very hard, ovoid, white to cream colored, shiny, smooth to somewhat pitted.

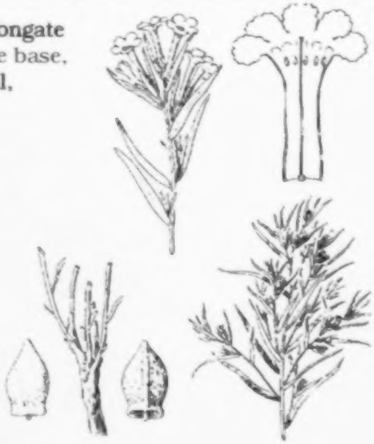
Key to Lithospermum

1.	Plants 2-5 dm. tall; flowers pale green-yellow, less than 10 mm. long, the tube not exceeding calyx; flower lobes entire; seeds smooth, 4-6 mm. long.	*L. ruderale*
	Plants 1-5 dm. tall; flowers bright yellow, 10-30 mm. long; flower lobes jagged; seeds pitted, 3-4 mm. long.	*L. incisum*

Key to Cryptantha

1.	Perennials, sparsely branched; corolla 6-8 mm. wide.	*C. macounii*
	Annuals, much branched from base; corolla much smaller.	*C. fendleri*

Lithospermum incisum Lehm. - Narrow-leaved Puccoon



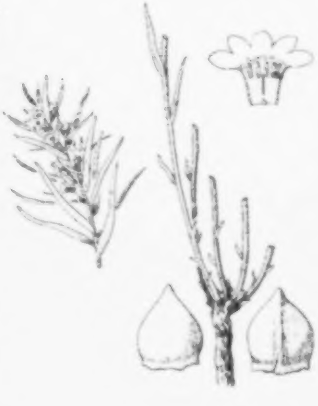
Growth Habit: Perennials from **stout woody, elongate taproots**; stems several from the base, **reclining-ascending, 1-5 dm. tall, coarse-hairy**.

Blades: Lowest leaves smaller/absent, cauline **well developed, linear-oblong, coarse-hairy and grey-green on both surfaces, 2-6 cm. long**; leaf margins with **yellowish glands**.

Inflorescence: **Early flowers bright yellow, salverform, 10-30 mm. long, the lobes jagged**, rather crowded in upper axils, these mostly infertile, smaller (often without petals) self-fertilizing flowers produced later, these scattered along stem, and producing fruit; nutlets **white-grey, 3-4 mm. long, shining, sparsely pitted**.

Similar Species:

1. ***Lithospermum ruderale*** Lehm. - Woolly Gromwell
Also found in southern regions but more confined to montane and foothills regions, occasional in the prairies. Grows in fescue grassland, on open slopes.
Differs as follows:
   - Plants generally taller (2-5 dm.).
   - Hairs longer and spreading, especially evident on stems and lower leaf margins.

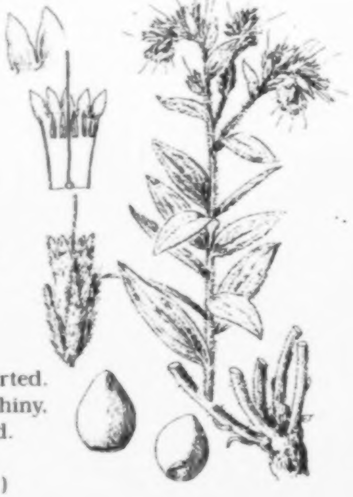


- Blades 3-10 cm. long, the upper nearly concealing flowers.
- Flowers pale greenish-yellow, less than 10 mm. long, the tube scarcely exceeding the calyx.
- Flower lobes entire, the tube glandular (inside) near the tip; flowers all fertile.
- Nutlets grey-white, smooth, and larger, 4-6 mm. long.

2. ***Onosmodium molle*** Michx. var. ***occidentale*** (Mack.) Johnston - False Gromwell

Found in the southern foothills region, in the southeastern parklands. Grows in open woods, on gravelly banks and flats.
Distinguished as follows:

- Perennials 4-8 dm. tall.
- Foliage rough-hairy.
- Blades ovate-lanceolate, 4-6 cm. long, entire, with 5-7 conspicuous nerves.
- Corolla 12-20 mm. long, greenish-white, the lobes acute.
- Styles conspicuously exserted.
- Nutlets white-brownish, shiny, smooth to shallowly pitted.

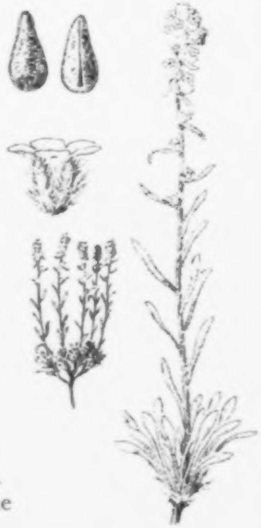


Other Species:

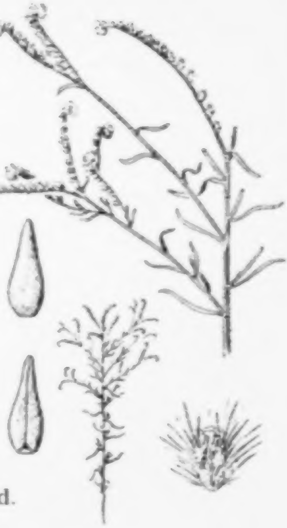
1. ***Cryptantha macounii*** (Eastw.) Payson – Cryptantha

Found in both foothills and prairie regions, but confined to the south. Grows in dry grassland, on open, exposed slopes.
Distinguished as follows:

- Taprooted perennials 1-3 dm. tall.
- Foliage grey-green with rough, blister-based hairs.
- Lowest leaves largest and most numerous, narrowly oblanceolate, not toothed, 1-6 cm. long, less than 5 mm. wide.
- Inflorescence coiled (scirpioid) in bud, narrow.
- Flowers white, salverform, 6-8 mm. across.
- Nutlets not prickly but roughened, to 3 mm. long, with a groove on the inner surface.



2. ***Cryptantha fendleri*** (A. Gray) Greene - Fendler's Cryptantha
   Frequent in sandy soil and dunes in the prairie region.
   Differs as follows:
   - Annuals, branching from near the base, often widely branching above.
   - Plants usually depressed but occasionally to 50 cm high.
   - Foliage rough-hairy.
   - Blades narrowly oblanceolate, 2-5 cm. long.
   - Flowers at the ends of branches in scirpioid clusters.
   - Calyx to 7 mm. long, closed after flowering, breaking apart at maturity.
   - Petals small, about 1 mm. broad.
   - Nutlets 4 or fewer, smooth.



Habitat & Distribution: Frequent, found in all ecoregions except the boreal forest. Grows in dry prairie grassland, on open, exposed hillsides and slopes.

Forage Value: Poor, all species rated as unpalatable and of little value as range plants.

Grazing Response: Increasers, more resistant to heavy utilization, trampling and droughty conditions than many associated species.

Notes: From the Greek *lithos*, stone, and *sperma*, seed, both this and the common name a reference to the hard seed; puccoon is a name given to various plants used in dyeing by native people, a violet dye obtained from the roots of *L. incisum*; as well, the tops and seeds were dried and used as incense; *Lithospermum* species were known to have medicinal properties, *L. ruderale* (and probably other species) contains natural estrogens, and, when taken, could prevent ovulation; more recently, stoneseeds have received pharmaceutical recognition for their analgesic value; *L. incisum* is our most attractive puccoon species, and is well suited for dry locations, both as an ornamental and for reclaiming slopes prone to erosion; *L. ruderale* also grows well on disturbances, and shows potential for use in foothills grasslands.

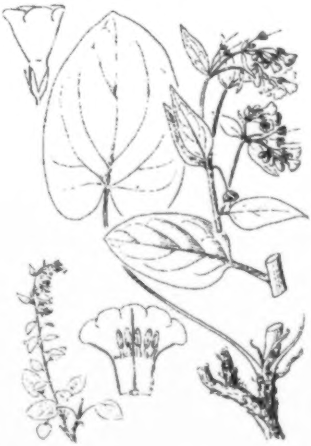
MERTENSIA Roth - Lungwort; Bluebells

Common Characteristics

- Perennials from stout tuberous or rhizomatous roots and usually a multiple caudex.
- Leaves alternate, entire, hairless to coarse-hairy.

- Cymes bractless, modified as panicles or racemes; calyx deeply 5-divided.
- Corolla shallowly 5-lobed, tubular/funnel-shaped, cup-shaped above the tube, blue, but immature buds often pink, 1 cm. long or more.
- Styles elongate but rarely much exserted.
- Nutlets without prickles, somewhat wrinkled.

Mertensia paniculata (Ait.) G. Don. var. ***paniculata*** - Tall Lungwort



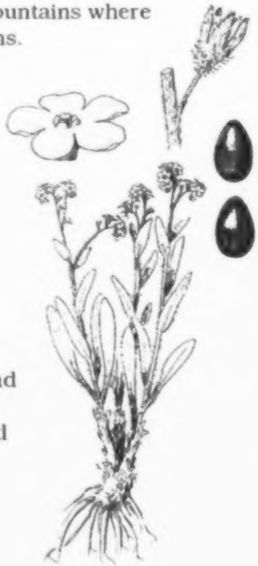
Growth Habit: Perennials **from thick rhizomes and a woody**, usually multiple **caudex**; stems erect, **3-10 dm. tall, coarse-hairy with white (often tinged with reddish-brown) hairs.**

Blades: Blades **ovate to oval-lanceolate**, the **bases often cordate**, the lower long-stalked, the upper short-stalked; blades essentially cauline, only the uppermost smaller; **lateral veins conspicuous**; coarse-hairy below, roughened-coarse-hairy above; blades 3-14 cm. long.

Inflorescence: Inflorescence **in panicles, open at maturity**; calyx 2-6 mm. long, hairy; flowers **5-lobed, tube-shaped, pink in bud, at length blue, 10-18 (20) mm. long**, appendages in throat conspicuous; nutlets without prickles, somewhat wrinkled.

Similar Species:

1. ***Myostis alpestris*** Schmidt ssp. ***asiatica*** Vestergr. - Alpine Forget-me-not
   Common but confined to the Rocky Mountains where found from montane to alpine elevations.
   Distinguished as follows:
   - Low perennials 1-3 dm. tall, tufted.
   - Foliage hirsute.
   - Basal blades spatulate-oblong, the upper narrower.
   - Calyx with some hooked or gland-tipped hairs, the lobes longer than the tubes.
   - Corolla blue, salverform, 4-6 mm. across.



Habitat & Distribution: Common in the foothills, montane, parkland and boreal forest regions, absent from the Cypress Hills. Found in moist, often shaded places: in rich, lush woodlands, in willow thickets, in moist/depressional meadows, on stream banks.

Forage Value: Poor to fair, generally fairly nutritious until freeze-up, ratings varying primarily with the abundance and palatability of other forage; *Mertensia* species are most often eaten by sheep, sometimes also readily eaten by game, but are seldom grazed to any extent by cattle.

Grazing Response: An increaser, spreading readily by rhizomes, but not considered a troublesome range species.

Notes: The name *Mertensia* is in honor of a German botanist, Franz Karl Mertens (1764-1831); *paniculata*, alluding to the type of inflorescence; tall lungworts, as well as our other less common *Mertensia* species, rate highly as ornamentals, and *M. paniculata* also recommended as an early successional forb in moister and wooded areas throughout its range; plants are probably most successfully propagated by transplanting or sprigging; lungwort is the host plant to the "police car" (*Gnophaela vermiculata*) moths, a black and white species common in open mixedwood areas, more readily observed than many moth species because of its diurnal nature.

LABIATAE - Mint Family

Common Characteristics

- Annual or perennial herbs, roots various.
- Stems commonly 4-angled (square).
- Foliage often strongly scented, and with small glands containing volatile oils.
- Leaves simple, often toothed, opposite.
- Flowers in clusters, these variously arranged.
- Calyx essentially 5-lobed, regular to irregular, cup-shaped to tubular.
- Corolla usually distinctly 2-lipped, 5-lobed.
- Stamens 4.
- Fruit of 4, 1-seeded nutlets.

Key to Labiatae

1. Stamens 2. .... **2**

Stamens 4. .... **3**

2. Flowers pink-purple, in dense head-like clusters; grassland plants. *Monarda*

Flowers in leaf axils, white; plants of wet places. *Lycopus*

3. Calyx with a helmet-like structure on upper side. *Scutellaria*

Helmet-shaped structure lacking. **4**

4. Corolla 4-lobed and nearly regular; stamens about equal; plants with mint odor. *Mentha*

Corolla 2-lipped; stamens unequal. **5**

5. Flowers in several clusters in leaf axils; calyx teeth spiny. *Galeopsis*

Flowers in terminal clusters. 6

6. Upper pair of stamens shorter than lower; calyx up to 10-nerved. 7

Upper pair of stamens longer than the lower; calyx with 15 or more nerves; corolla blue. *Agastache*

7. Calyx not 2-lipped, the teeth equal; plants glandular-pubescent. *Stachys*

Calyx 2-lipped, the upper lip 3-toothed; plants glabrous to pubescent. *Prunella*

MENTHA L. - Mint

Common Characteristics

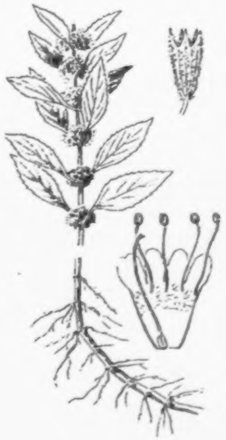
- Mint-odored perennials from rhizomes.
- Leaves cauline.
- Calyx nearly regular.
- Corolla nearly regular, 4-lobed, upper lobe often slightly wider, pink-purple.
- Stamens 4, exserted, mostly equal.
- Nutlets ovoid.

Mentha arvensis L. - Wild Mint

Growth Habit: Perennial **from creeping rhizomes; stems 4-angled**, erect-ascending, **2-5 dm. tall**, with short hairs, often restricted to angles, especially below.

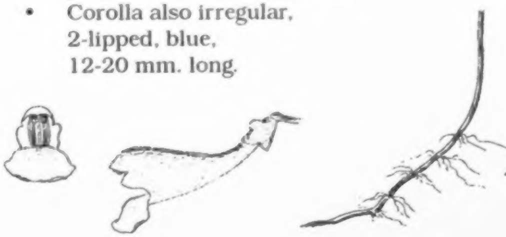
Blades: Leaves cauline, ovate-lanceolate, short-stalked, **2-8 cm. long**, pointed, **toothed, or lower entire**, sparsely hairy to hairless; both surfaces with sunken glands; **foliage strongly mint-scented**.

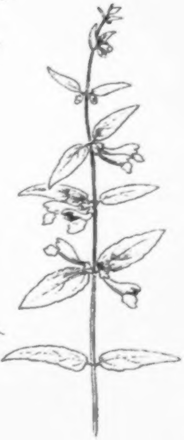
Inflorescence: Flowers **in dense axillary whorls** on upper 1/2 of stem; calyx 2-3 mm. long, hairy, **nearly regular**; corolla **appearing regular** but usually with upper lobe slightly wider; corolla **pink-light purple, 4-7 mm. long**; fruit of 4 oval nutlets.



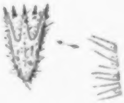
Similar Species:

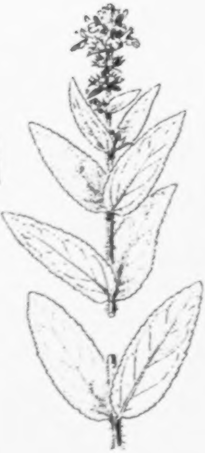
1. ***Scutellaria galericulata*** L. - Marsh Scullcap
Most common in the boreal forest, with a few occurrences in parkland and foothills regions. Grows in wet places, on shores.
Differs as follows:
   - Foliage not strongly scented.
   - Calyx 2-lipped, with a helmet-shaped projection on the upper side.
   - Corolla also irregular, 2-lipped, blue, 12-20 mm. long.



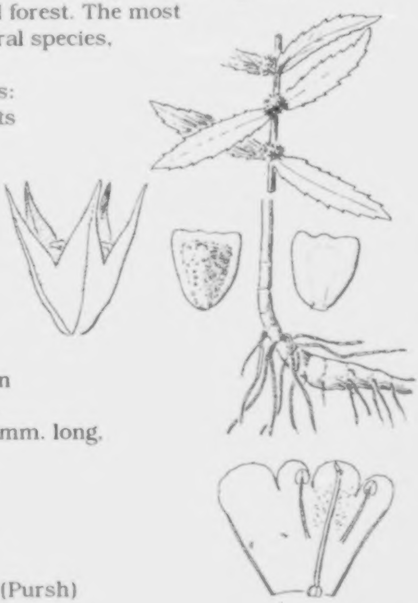


2. ***Stachys palustris*** L. ssp. ***pilosa*** (Nutt.) Epling. - Marsh Hedge Nettle
Common throughout most regions, somewhat less frequent in the prairies. Grows on shores, in depressional meadows, in moist, rich thickets.
Distinguishing features:
   - Plants rhizomatous.
   - Stems rough-hairy and glandular, the hairs blister-based.
   - Foliage not conspicuously scented.
   - Blades ovate-oblong, heart-shaped at the base, 4-9 cm. long, distinctly toothed.
   - Leaves rough-hairy above.
   - Calyx purplish, lobes nearly equal, the tips sharp-pointed.
   - Corolla 2-lipped, the lower lip 3-lobed.
   - Corolla purplish, white-spotted.
   - Upper 2 stamens shortest.



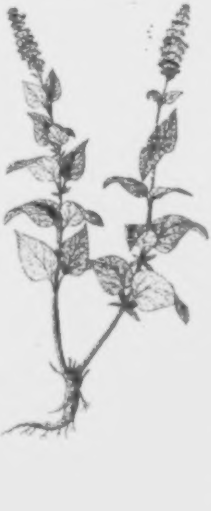


3. ***Lycopus asper*** Greene - Western Waterhound
Found throughout the prairie and parkland regions, occasional in the boreal forest. The most common locally of several species, found on shores.
Distinguished as follows:
- Tuber-bearing plants 3-5 dm. tall.
- Stems stout, erect, with spreading hairs.
- Leaves sessile, oblong-lanceolate, usually toothed.
- Calyx lobes long-pointed, longer than nutlets at maturity.
- Flowers white, 3-5 mm. long, nearly regular, in axillary clusters.
- Stamens 2.
- Mint odor lacking.

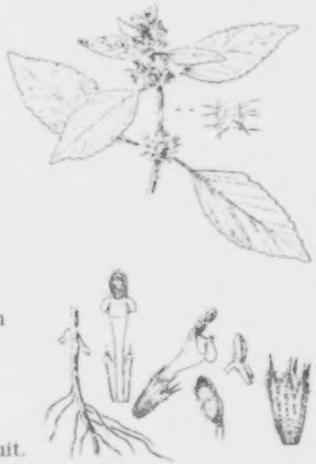


Other Species:

1. ***Agastache foeniculum*** (Pursh) Ktze. - Giant Hyssop
Most frequent in the parkland region. Found in moist grassland and thickets, in open woods.
Distinguishing features:
- Creeping perennials, 5-10 dm. tall.
- Stems mostly glabrous (except in inflorescence).
- Blades ovate, pointed and serrate, short-stalked; foliage licorice-scented.
- Blades green and glabrous above, white below with a fine pubescence.
- Flowers small, numerous, in interrupted terminal spikes.
- Calyx 15-nerved, pubescent, purplish, with teeth 1-2 mm. long.
- Corolla blue, longer than calyx.
- Stamens 4, exserted, the upper pair longer.



2. ***Galeopsis tetrahit*** L. - Hemp Nettle
   An introduced species, common in waste and disturbed places.
   Distinguishing features:
   - Annuals, stems 3-8 dm. tall, with spreading, rusty bristly hairs.
   - Nodes swollen.
   - Blades stalked, ovate-lanceolate, to 12 cm. long, coarsely serrate.
   - Blades mostly glabrous beneath, with scattered rough hairs above.
   - Flowers in whorls in upper leaf axils.
   - Calyx tube 5-ribbed, with 5 spiny lobes, enlarging in fruit.
   - Corolla 15-22 mm. long, pinkish and with 2 yellow spots.
   - Upper lip entire, arched, the lower lip 3-cleft, with 2 basal protuberances.
   - Stamens 4, anthers pubescent.



Habitat & Distribution: Common throughout all ecoregions. Grows in moist to wet places: on shores, around sloughs, in marshes, sometimes found in shallow water.

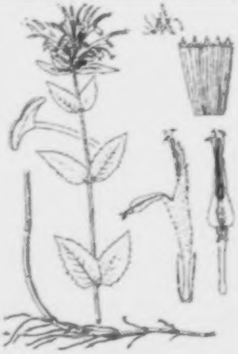
Forage Value: Poor; although utilized to some extent, especially by sheep in the absence of choice forage, wild mint is generally rated as unimportant as a range species.

Grazing Response: Increasers (all mentioned species).

Notes: The generic, a Greek name for a nymph, *Minthe*, later *Mentha*, the Latin term applied by Pliny; *arvensis*, translating field; members of the genus contain scented oils, long used as a source of mint flavoring; *M. arvensis* was used by aboriginal people as a tea, flavoring in pemmican and soups, also a herbal remedy for teething pains, rheumatism, chest pains, pneumonia (sometimes mixed with catnip), and stomach trouble; the species was also used to destroy human scent on traps, and to repel mice and rats; both *Stachys palustris* and *M. arvensis* are recommended as early successional reclamation species for moist places, often naturally reclaiming disturbances around wetlands; they can be successfully propagated on upland sites in good soil and moisture zones, and can be reproduced by both seed and root sprigs; *Agastache* has been grown for use as a licorice-flavored tea.

MONARDA L. - Wild Bergamot; Horse Mint

Monarda fistulosa L. - Horse Mint



Growth Habit: Perennials **from creeping rhizomes**; stems erect, 3-7 dm. tall, little-branched, **4-angled**, sparsely to densely **finely hairy with short hairs** (sometimes longer ones on angles); plants **with a strong rather characteristic odor**.

Blades: Leaves **cauline, opposite, ovate-triangular to lanceolate, toothed, 2.5-8 cm. long**, short-stalked; blades **with very fine, soft hairs below or nearly hairless**, especially above; leaves paler beneath, the **veins pale yellow-green and conspicuous, both surfaces glandular-pitted**.

Inflorescence: Flowers **in a solitary, large, compact terminal head**, this leafy, bracteate at the base; calyx tubular, 7-11 mm. long, with very short teeth (1 mm. long), hairy within; corolla **large, 2.5-3.5 cm. long, purple, hairy, distinctly 2-lipped**, the stamens (2) surpassing the upper lip, this bearded at the tip, narrow; lower lip 3-lobed; nutlets smooth, oblong.

Habitat & Distribution: Frequent in the foothills, montane and parkland regions, occasional elsewhere. Found in fescue grassland, open woods and thickets, clearings. Restricted to moister habitats in driest regions.

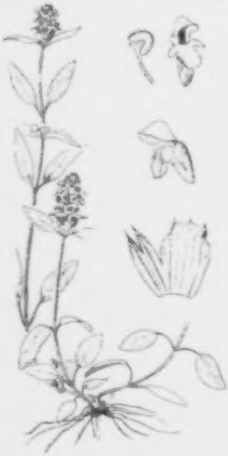
Forage Value: Fair, nutritional elements at acceptable levels, palatability ratings varying, depending on availability of other good forage, generally rated as fair to good for sheep, and poor to fair for cattle and game.

Grazing Response: An increaser #1, fairly resistant to grazing, but not overly aggressive, and tending to decline with heavy grazing pressure.

Notes: Syn. *M. menthaefolia*; named for Nicola Monardes, 1493-1588, a Spanish physician and botanist; *fistulosa* means hollow, the reference lost; also known as wild bergamot; *Monarda* species contain volatile oils, and have been used extensively by native people, infusions of leaves taken to treat flatulence and colic, colds, fevers, insomnia, heart trouble, and to relieve headaches, backaches, and stomach upset; as well, poultices were applied to clear up acne; the Cree Indians recognized the aromatic value of the species, using dried flowers as a perfume, and this and related species are currently used in the manufacture of perfume; horse mint is worthy of a spot in a native garden, and is a recommended species for wild flower mixes used in revegetating native grasslands; plants establish readily from seed and show strong rhizome growth, but do not out-compete other valuable species.

PRUNELLA L. - Heal-all

Prunella vulgaris L. ssp. ***lanceolata*** (Bart.) Hult. - Heal-all



Growth Habit: Perennials from a caudex and fibrous roots or short rhizomes; stems solitary or several, **reclining-ascending or more or less prostrate, 1-5 dm. long**; stems often red-tinged, with multicellular hairs, at least in lines decurrent from leaf bases and at nodes.

Blades: **Leaves few, petiolate**, usually both basal and cauline, **ovate-elliptic to lanceolate, the blades 2-9 cm. long**; lowest broader and more rounded at the base, **the margins entire to obscurely toothed**; leaf surfaces glabrous or with a few stiff multicellular hairs, often rusty-tinged.

Inflorescence: **Flowers in dense terminal spikes 2-5 cm. long, subtended by uppermost leaves; bracts broadly ovate-reniform, cuspidate, purple-tinged toward the apex, ciliate**; calyx 7-10 mm. long, **essentially 2-lipped, the upper with 3 spiny teeth, the lower 2-lobed, these spine-tipped; calyx purplish, the veins prominent**, somewhat ciliate; **corolla pale blue to white or blue-violet, 1-2 cm. long, 2-lipped, the upper arched and entire, the lower with 3 lobes**, the middle the broadest; **stamens 4, the upper shortest**; filaments forked at the tip, with only one prong anther-bearing; fruit of 4 smooth nutlets.

Habitat & Distribution: Found in western regions, absent from the boreal forest. Grows in moist/depressional grassland, in open woods. Often locally abundant.

Forage Value: Poor, possibly somewhat palatable but unproductive and as such an unimportant range plant.

Grazing Response: An increaser.

Notes: From *prunum* (purple), a Latin term referring to the flower color; also known as self-heal, the common names derived from its status as a medicinal herb, popular both in Europe, and more locally among native tribes; *Prunella* is listed as diuretic, tonic, astringent, antispasmodic, and styptic, used in the treatment of internal and external wounds, laryngitis, hemorrhage, diarrhea, convulsions, also supposedly expels worms; as frequently occurs with anything highly esteemed by human culture, superstitions became associated with the species, the plants apparently thought to be useful in exorcising devils.

SCROPHULARIACEAE - Figwort Family

Common Characteristics

- Annual to perennial herbs (rarely woody), roots various.
- Leaves mostly opposite, occasionally alternate or whorled, simple to divided.
- Flowers perfect, the petals united.
- Flowers usually irregular, mostly 2-lipped with a 2-lipped upper lobe and 3-lipped lower lobe.
- Fruit a 2-valved, many seeded capsule.

Key to Scrophulariaceae

1. Flowers yellow, the corolla snapdragon-like (spurred); introduced. *Linaria*

Corolla not spurred. 2

2. Leaves opposite. 3

Leaves alternate. 8

3. Sterile, 5th stamen present, this often bearded. *Penstemon*

Sterile, 5th stamen absent. 4

4. Calyx 4-lobed. 6

Calyx 5-lobed. 5

5. Leaves opposite, flowers yellow or pink, showy. *Mimulus*

Upper leaves mostly whorled, flowers blue, small (to 6 mm.). *Collinsia*

6. Stamens 2. *Veronica*

Stamens 4. 7

7. Leaves toothed; calyx about 1 cm. long, enlarging and membranous-veiny at maturity; flowers yellow. *Rhinanthus*

Leaves mostly entire; calyx shorter, not inflated in fruit; flowers with white/yellow/purple. *Melampyrum*

8. Small (to 3 dm.) grey-hairy plants with basal leaves prominent, cauline inconspicuous; stamens 2; corolla absent. *Besseya*

Stamens more than 2 (4-5); corolla present. 9

9. Plants large, felty-hairy, stamens 5; corolla with 5 distinct, regular lobes; weedy. *Verbascum*

Plants not large and felty-hairy; stamens 4; corolla irregular. 10

10. Floral bracts brightly colored, large, petal-like; true corolla small, mostly concealed. *Castilleja*

Floral bracts smaller, green; corolla conspicuous. 11

11. Basal leaves absent; lower cauline leaves entire, linear, the upper 3-divided; corolla yellow. *Orthocarpus*

Basal leaves mostly present, toothed to pinnately lobed; corolla variously colored. *Pedicularis*

CASTILLEJA Mutis *ex* L.f. - Indian Paint-brush

Common Characteristics

- Taprooted perennial herbs.
- Leaves alternate, entire to dissected, cauline.
- Flowers in short to elongate prominently bracteate terminal spikes.
- Calyx of 4 nearly equal lobes.
- Bracts conspicuous, often brightly colored, entire to cleft, often concealing flowers.
- Corolla elongate and narrow, 2-lipped, the upper one (galea) arched, beak-like, the lower short to nearly obsolete, 3-lobed.
- Capsules with numerous small seeds.

Key to Castilleja

1. Flowers pink to red to purple. 2

Flowers yellow. 3

2. Calyx purple; leaves narrow (2-5 mm. wide); boreal. *C. raupii*

Calyx red to pink or pale yellow-pink; leaves more than 5 mm. wide; widespread, common. *C. miniata*

3. Upper leaves lobed. *C. lutescens*

Upper leaves mostly entire. 4

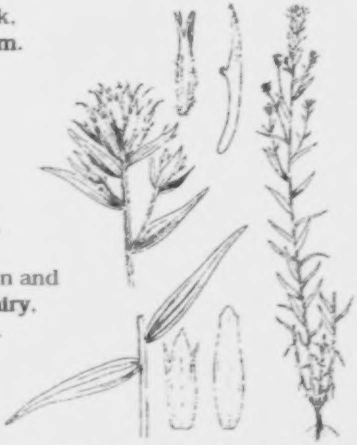
4. Plants with short hirsute/scabrous hairs; bracts with distinct lobes. *C. lutescens*

Plants with longer villose hairs; bracts mostly entire, or with a few short lobes. 5

5. Bracts obtuse; galea less than 1/2 as long as corolla tube; southern Rocky Mountain species. *C. occidentalis*

Bracts acute; galea at least 2/3 as long as corolla tube; widespread. *C. miniata*

Castilleja miniata Dougl. *ex* Hook. - Common Red Paint-brush



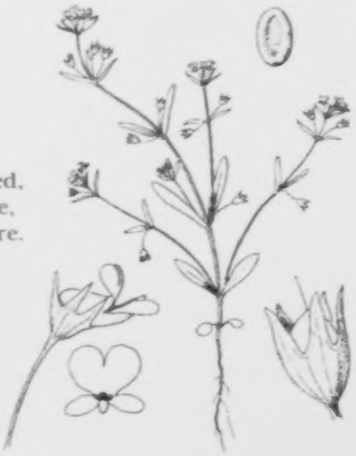
Growth Habit: **Taprooted perennials** from a thick, rather woody crown; stems **2-8 dm. tall**, often branched, **hairless to short-hairy, rarely viscid-long-hairy with multicellular hairs** except sometimes sparsely so at summit.

Blades: Leaves **narrowly lanceolate-ovate**, usually entire, but **uppermost sometimes 2-3 lobed**; blades green and **hairless to sparingly and finely hairy**, not viscid; **nerves 3**, conspicuous.

Inflorescence: Inflorescence showy, at first compact, later elongating, the **bracts pink to reddish-orange to scarlet, rarely cream to pale yellow**; bracts ovate-oblong, **mostly cleft into pointed segments**, long-hairy with multicellular hairs and somewhat viscid; calyx 15-25 mm. long, with **primary lobes again cleft into narrow pointed segments**; corolla 20-40 mm. long, the **upper lip (galea) hairy, about 3/4 as long as the tube, about 5 times the length of the lower lip**, this thickened, dark green; fruit a capsule with numerous small seeds.

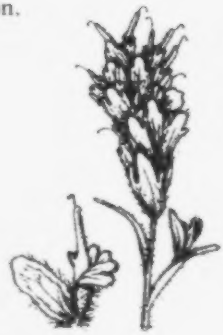
Other Species:

1. ***Collinsia parviflora*** Lindl. - Blue-eyed Mary
   One of the more common, smaller members of the family, found in the southern Rocky Mountains, Cypress Hills. Distinguished as follows:
   - Slender annuals, often branched, 1-3 dm. tall, glabrous or somewhat glandular.
   - Leaves opposite to whorled, ovate to lanceolate, obtuse, 1-2 cm. long, usually entire.
   - Flowers usually several in a whorl.
   - Calyx 5-parted, corolla 2-lipped, the upper lip again 2-divided.
   - Corolla blue to whitish, 4-6 mm. long.
   - Stamens 5, with 4 fertile.
   - Capsules several seeded, 3-4 mm. long.



Similar Species:

1. ***Castilleja rauppii*** Pennell - Paint-brush
   Most common in the northern boreal region, occasional in southern boreal areas on suitable sites. Found in bogs, in moist woods, in marshy places.
   Differs as follows:
   - Rather slender, often purple-tinged plants 3-5 dm. tall.
   - Leaves and stems often finely pubescent.
   - Leaves linear, pointed, with a few lobes or entire.
   - Flowers (bracts, calyx, lip) purple, inflorescence finely hairy.
   - Bracts oval-lanceolate, with 2 linear lobes, calyx divided/lobed.
   - Corolla 14-18 mm. long.



Habitat & Distribution:

Common in all regions except the prairies. Found in open woods, in foothills fescue grasslands, in open, lush meadows.

Forage Value:

Poor to fair, this rating applied to the genus in general, both nutritional level and palatability varying from fairly good to poor, depending on the species and associated vegetation; although sheep have been observed to make considerable use of the foliage, paint-brushes are usually considered of secondary importance as range plants; *Castilleja* species are secondary selenium absorbers, but only rarely do they accumulate sufficient quantities to be troublesome.

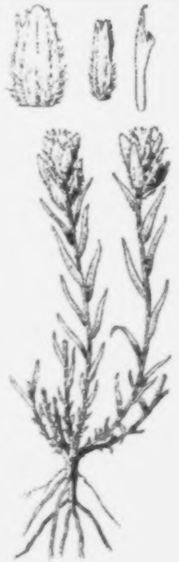
Grazing Response:

An increaser, although not overly aggressive due to taprooted growth habit and rather poor seed viability.

Notes:

Named for Domingo Castillejo, a Spanish botanist; *miniata* translates red, or painted red; the flowers of *Castilleja* species can be eaten, the nectar at the base of the corolla tube especially palatable; the genus also has some acclaimed medicinal value, primarily used to treat "women's diseases" and venereal disease, also used as a love charm by some native groups, and applied to hair along with grease to make it glossy; Indian paint-brushes are very attractive, in particular those species which show a wide variation in color; propagation, especially by seed, is of limited success: only small amounts of viable seed are often produced as a result of insect activity, and, as well, roots are semiparasitic, and it is suspected that they have a dependency on certain soil bacteria that makes establishment difficult; castillejas are in demand for wild flower mixes used for reclamation work, but seed may always be expensive and in short supply. *Note*: S. Rocky Mountain specimens with more hirsute foliage, upper leaves distinctly lobed, flowers red-orange key to *C. hispida* Benth.

Castilleja occidentalis Torr. - Lance-leaved Paint-brush



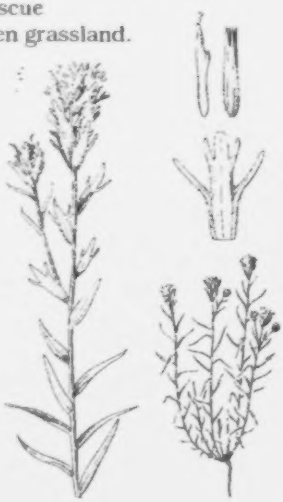
Growth Habit: Taprooted perennial from a woody crown; **stems 1-2 dm. tall, unbranched, usually several**, purplish-tinged, **villose-viscid**, often sparsely so below and densely so above.

Blades: Leaves linear-lanceolate, **usually entire but uppermost sometimes with 1-2 linear lobes**, not strongly overlapping; **blades moderately villose-viscid**, often purple-tinged.

Inflorescence: **Inflorescence villose-viscid**, compact, **the bracts yellow**, drying dark purplish, ovate to oblong, **the apex rounded, entire or with 1-2 short blunt lobes**; calyx villose, 15-20 mm. long, **the lobes again cleft, blunt**; corolla finely hairy, 15-25 mm. long, **the galea distinctly shorter (to 1/2) than the tube, the lower lip relatively prominent, up to 1/3 the length of galea.**

Similar Species:

1. ***Castilleja lutescens*** (Greenm.) Rydb. - Stiff Yellow Paint-brush
   Frequent in the southern foothills fescue and prairie ecoregions. Found in open grassland. Differs as follows:
   - Plants often taller (to 6 dm.), usually branched.
   - Pubescence of short, rough hairs.
   - Leaves entire or with a few narrow, acute lobes.
   - Bracts entire or with narrow, rounded lobes.
   - Calyx lobes acute.
   - Galea less than 1/2 as long as corolla tube.



Habitat & Distribution: Common in the foothills and southern Rocky Mountain region. Found in foothills and montane grasslands and meadows, in open woods.

Forage Value: Poor to fair, consumption to any extent usually related to a shortage of more palatable forage; as a secondary selenium absorber, the foliage can be toxic when plants occur in soils with very high selenium levels.

Grazing Response: Increasers, *C. lutescens* in particular is noted to respond to declining range condition by increasing in open fescue grasslands.

Notes: The specific *occidentalis* refers to a western distribution; medicinal value of castillejas was, at one time, considerable (see notes under *C. miniata*), although plants can be somewhat poisonous when growing in seleniferous soils; the semi-parasitic nature of *Castilleja* allows it an additional survival technique in adverse enviro-climatic conditions, the roots capable of relying upon other species for their nutrients; it is also this subterranean interrelationship that is responsible for difficulties incurred when attempting propagation by both seed and transplanting.

LINARIA Mill. - Toad-flax

Common Characteristics

- Annual to perennial herbs, taprooted or spreading from extensive rhizomes.
- Blades mostly stalkless, alternate (or opposite below), often numerous and crowded, entire.
- Flowers showy, in terminal racemes.
- Flowers yellow (blue-violet in one rare annual).
- Calyx 5-cleft to near the base.
- Corolla spurred at the base, 2-lipped, the upper erect and 2-lobed, the lower 3-lobed, with an orange palate in the throat.
- Fruit an ovoid-cylindrical capsule opening by apical valves.
- Seeds usually numerous.

Key to Linaria

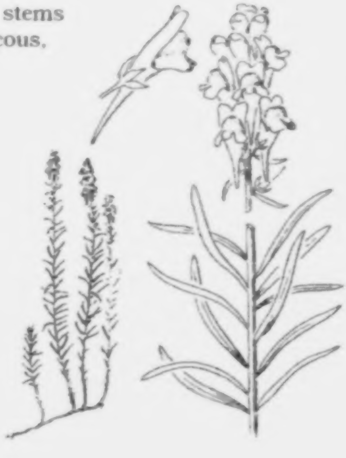
1. Cauline leaves green, linear, narrow at base; flowers 2-3.5 cm. long. *L. vulgaris*

Cauline leaves glaucous, ovate-lanceolate, cordate-clasping at base; flowers 3-4 cm. long. *L. dalmatica*

Linaria vulgaris **Hill** - Toad-flax; Butter-and-eggs

Growth Habit: Perennials **from deep, elongate rhizomes**, forming dense patches; stems **2-8 dm. tall**, often somewhat glaucous, hairless to finely hairy above.

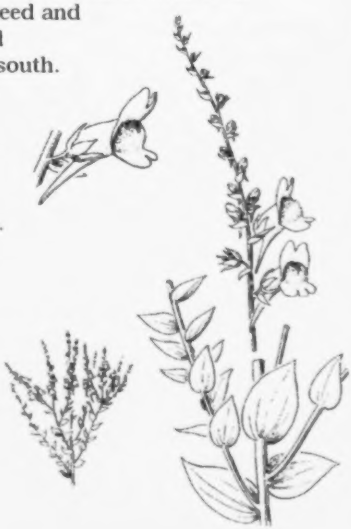
Blades: Leaves **numerous and crowded, linear and narrowed toward base, 2-10 cm. long**, hairless, pale green, the midrib prominent below, the **margins often somewhat rolled**.



Inflorescence: Racemes dense at first, elongating; **flowers snapdragon-like, bright yellow**, with a bearded palate, **2-3.5 cm. long, the spur about as long as the rest of the corolla; capsules 8-12 mm. long, broadly cylindric**, tipped by the persistent style; seeds flattened, with a circular wing.

Similar Species:

1. ***Linaria dalmatica*** (L.) Mill. - Dalmation Toad-flax
   Also an introduced noxious weed and becoming rather common and widespread, especially in the south. Differs as follows:
   - Plants somewhat more robust, taller (6-10 dm.).
   - Cauline blades ovate-lanceolate, clasping.
   - Foliage hairless, glaucous.
   - Flowers often larger, to 4 cm. long.



Habitat & Distribution: Introduced and common, especially in southern regions.

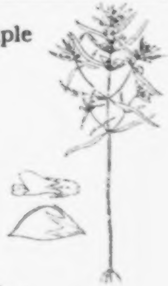
Forage Value: Poor, both our species worthless as range plants, seldom eaten except in the absence of other forage.

Grazing Response: Invaders, introduced from the Mediterranean as ornamentals; toad-flaxes are noxious weeds, capable of spreading rapidly by both aggressive rhizomes and an abundance of winged seeds; although persistent mechanical and chemical controls are relatively effective in eradicating toad-flax from cultivated and disturbed land, *Linaria* species are encroaching rapidly onto rangeland and poorly tilled land, resulting in increasingly large infestations that are much more difficult to control.

Notes: *Linaria* originates from *Linum*, the foliage of some species resembling that of flax, *vulgaris* means common; butter-and-eggs, a reference to the attractive flowers.

MELAMPYRUM L. - Cow-wheat

Melampyrum lineare Desr. - Cow-wheat



Growth Habit:	**Taprooted annuals 1-4 dm. tall; stems slender, simple to few-branched, usually with some glandular pubescence,** this often in lines decurrent from leaf bases.
Blades:	**Leaves opposite, linear-lanceolate, mostly entire or the uppermost with a few teeth near the base, 2-5 cm. long,** usually somewhat glandular-hairy.
Inflorescence:	Flowers either solitary in leaf axils or in terminal leafy spikes, the bracts (reduced leaves) usually with a few divergent teeth near the base; **calyx 4-lobed**, somewhat glandular-hairy; **corolla 8-12 mm. long, whitish to purplish and yellow-tipped**, 2-lipped, the upper lip hooded and mostly entire, the lower 3-lobed; **stamens 4**; capsules curved and asymmetrical, dehiscent along the convex margin, glandular-hairy; seeds 1-4, each 2-4 mm. long, blackish with pale tips.
Habitat & Distribution:	Found primarily in the boreal forest, occasional in the foothills and montane regions. Grows in moist, often boggy wooded areas, in mossy coniferous forests, also in drier sandy jack pine woods. A common boreal species and an indicator of some ecosites within this ecoregion.
Forage Value:	Poor, producing insignificant quantities of forage.
Grazing Response:	An increaser in its adapted range.
Notes:	The generic name is derived from the Greek *melas*, black, and *pyros*, wheat, alluding to the seed color; similar to other native annuals (several of these also in the figwort family), cow-wheat is characteristically non-aggressive, and at the same time, capable of providing immediate cover on disturbances; for this reason, these species are of some value in the early successional phases of site restoration.

MIMULUS L. - Monkey-flower

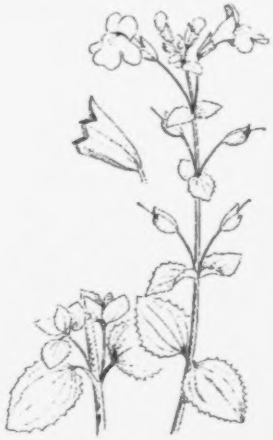
Common Characteristics

- Annuals or perennials, often weak and reclining.
- Leaves opposite, toothed.
- Flowers in leaf axils, conspicuous.
- Calyx 5-lobed, angled, the lobes longer than tube.
- Corolla 2-lipped, upper lobes erect-reflexed, lower lobes spreading.
- Stamens 4, stigma 2-lipped.
- Capsule 2-valved, with numerous seeds.

Key to Mimulus

1.	Flowers mostly yellow (red-dotted), to 4 cm. long	*M. guttans*
	Flowers red, to 5 cm. long	*M. lewisii*

Mimulus guttans DC. - Yellow Monkey-flower



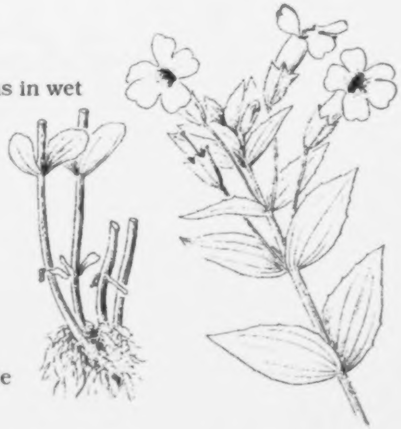
Growth Habit: **Annuals to perennials**, stems **often weak and trailing**, 0.5-6 dm. long, **stoloniferous**.

Blades: Leaves glabrous to glandular hairy, **1-5 cm. long**, the lower stalked, **oval-obovate, toothed**.

Inflorescence: Flowers solitary to several in axils, **yellow, red-spotted, with hairy ridges in the throat, 2-4 cm. long; calyx 1-2 cm. long, with unequal teeth**; capsules 2-valved.

Similar Species:

1. ***Mimulus lewisii*** Pursh - Red Monkey-flower
   Confined to the southern Rocky Mountains where found along steams from montane to alpine elevations.
   Distinguished as follows:
   - Flowers red, 3.5-5 cm. long.



Habitat & Distribution: Found in the Rocky Mountains in wet meadows, along streams, in seepages. Grows from montane to subalpine and alpine areas.

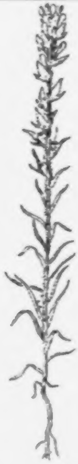
Forage Value: Poor, sometimes grazed by sheep and wildlife, but under normal conditions monkey-flowers are of inferior palatability, also rarely produce any worthwhile amounts of forage.

Grazing Response: Increasers, but not intrusive, this at least partly because our species are site specific, confined to high moisture areas.

Notes: The generic (and common) name is derived from *mimus*, the flower supposedly with an ape-like face; the specific name, appropriately, means spotted; the foliage of our local species is apparently edible, early settlers calling it wild lettuce and using the leaves as a salad green; *Mimulus* is a genus rather well known in horticultural circles, a number of species cultivated as ornamentals; *M. guttans* is unusually unstable and plastic, showing a variety of growth forms and color variations at the species level, and for this reason has been the subject of some experimentation, resulting in hybrids and variegated flower color.

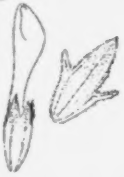
ORTHOCARPUS Nutt. - Owl-clover

Orthocarpus luteus Nutt. - Owl-clover



Growth Habit: **Annuals**, stems erect or somewhat branched above, **1-4 dm. tall, with rather long spreading viscid and often glandular hairs.**

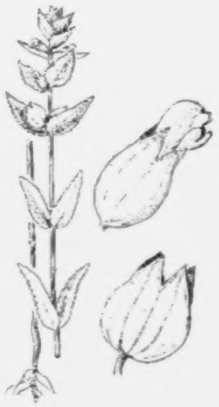
Blades: Leaves cauline, **alternate, rather numerous, stalkless, linear or narrowly lanceolate**, 1-4 cm. long, **entire or the upper trifid**; leaves gradually reduced upward into bracts (these trifid); foliage **glandular-viscid.**



Inflorescence: Spikes terminating upper branches, elongating at maturity; calyx short (6-8 mm.), subequally 4-lobed, pale below and green-tipped, viscid; corolla **yellow, hairy, 9-14 mm. long**; lower lip **sac-like**, with 3 minute teeth, the upper lip broad, about equalling lower lip; stamens 4, each with two dissimilar anther sacs; capsules **5-7 mm. long**, seeds ridged, about 1 mm. long.

Similar Species:

1. ***Rhinanthus minor*** L. - Yellow Rattle
Frequent in the foothills, montane and boreal forest ecoregions. Grows in moist meadows and grassland, in open woods. Also an annual.
Distinguished as follows:
   - Stems angled and hairy in lines; 3-6 dm. tall.
   - Blades opposite, narrowly lanceolate-oblong, stalkless, toothed.
   - Blades often dark and pale mottled.
   - Calyx membranous, flattened, 4-toothed, much enlarged and net-veined at maturity.
   - Flowers yellow, 9-14 mm. long.
   - Capsules circular, flat.



Habitat & Distribution: Common in southern regions. Also in a few localities in the northern boreal forest. Grows in dry grassland, on dry slopes.

Forage Value: Poor, with low palatability for cattle, sometimes eaten by sheep.

Grazing Response: An increaser, producing large quantities of highly viable seed and opportunistic on disturbances and depleted rangeland, but rarely abundant enough to be considered troublesome.

Notes: From the Greek, *orthos*, straight, and *karpos*, fruit, in reference to the pod; *luteus*, means yellow; the species was used by Blackfoot Indians as a source of dye for small skins, horsehair and feathers, the crushed foliage used to produce a reddish dye; the primary commercial value of *O. luteus* lies in the fact that, as with other annuals, it is an excellent early successional species, providing instant cover, yet not out-competing perennial grasses once they establish. *Note: Rhinanthus minor* also fits this niche equally as well, and both species are in early experimental stages of development.

PEDICULARIS L. - Lousewort

Common Characteristics

- Perennial (annual/biennial) herbs, roots varying from fibrous (and sometimes tuberous) to taproots or rhizomes.
- Leaves mostly alternate, occasionally opposite or basal (and plants acaulescent).
- Blades from shallowly toothed to deeply pinnately lobed.
- Flowers mostly in terminal spike-like racemes or spikes, occasionally axillary.
- Calyx regularly to irregularly 2, 4 or 5-cleft.
- Corolla 2-lipped, the upper lobe (galea) hooded and often beaked, the lower shorter, 3-lobed.
- Stamens 4, with 2 longer, the anthers enclosed in the galea.
- Stigmas capitate.
- Capsules flattened, asymmetrical, with numerous, roughened-slightly winged seeds.

Key to Pedicularis

1. Short-lived perennials to annuals; stems branched; bog species. 2

Longer lived perennials; stems not branched. 3

2. Glabrous annuals/biennials; flowers purple, in leaf axils, solitary or a few in spikes. *P. parviflora*

Hairy (at least somewhat) biennials/short-lived perennials; flowers yellow (galea purplish), several in spikes. *P. labradorica*

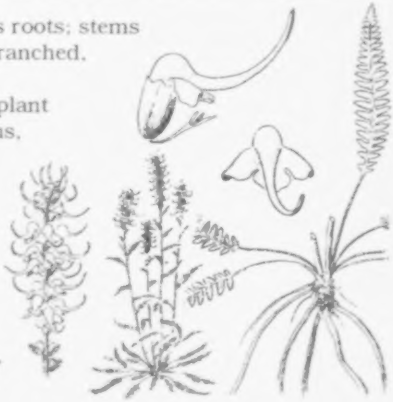
3. Galea with an elongate, slender, upcurved beak; flowers pink-purple; plants of marshy places. *P. groenlandica*

Galea without beak; flowers yellowish and purple-tinged; woodland plants. *P. bracteosa*

Pedicularis groenlandica Retz. - Elephant Head

Growth Habit: Perennials with coarse fibrous roots; stems often several in a cluster, unbranched, caudex poorly to rather well developed; stems (and entire plant except for calyx lobes) glabrous, **red-purple**, 2-6 dm. tall.

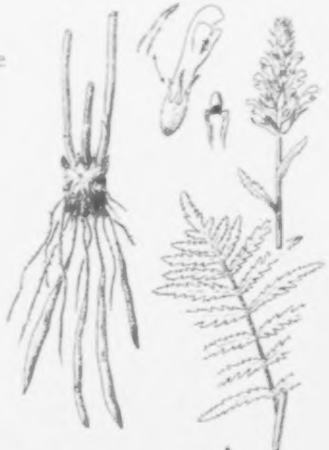
Blades: Blades 5-25 cm. long, lanceolate, the lower long stalked, the upper sessile; blades both basal and cauline (alternate); leaves **deeply pinnatifid and again incised, the margins narrowly whitish-thickened.**



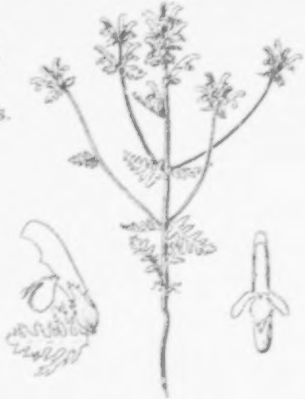
Inflorescence: Flowers in a dense, elongate spike, **reddish-purple**; calyx lobes 5, short, very short ciliate; corolla **1-1.5 cm. long**, the galea **hooded**, short, but **with a long (to 1 cm.) slender downward, then upturned beak**, lower lip small; capsules flattened, asymmetrical.

Similar Species:

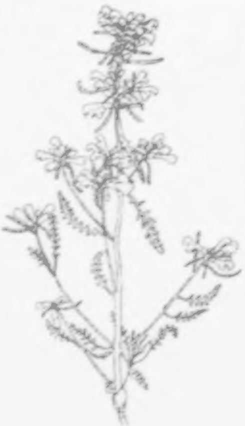
1. ***Pedicularis bracteosa*** Benth. - Lousewort
   Common in wooded areas in the Rocky Mountain and foothills regions, also in Cypress Hills. Distinguished as follows:
   - Stems simple, 3-10 dm. tall.
   - Plants mostly glabrous.
   - Leaves pinnately divided, then lobed (fern-like).
   - Spikes dense, 5-15 cm. long.
   - Calyx lobes long-pointed, glandular hairy.
   - Corolla yellow, 15-20 mm. long, usually purple-tinged.
   - Galea beakless, without small teeth at the tip, hooded at the apex.



2. ***Pedicularis parviflora*** J.E. Smith - Swamp Lousewort
Primarily a southern boreal species, with a few occurrences in the foothills region. Found in bogs (often associated with calcareous conditions), in wet, swampy places.
Differs from *P. labradorica*:
- Annuals/biennials 3-6 dm. tall, branching.
- Plants glabrous, often purplish.
- Leaves alternate (opposite), deeply pinnate.
- Flowers solitary in leaf axils or a few in spikes.
- Corolla 12-15 mm. long, purple.

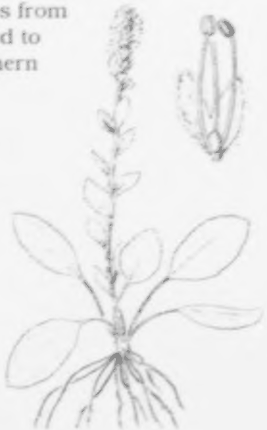


3. ***Pedicularis labradorica*** Wirsing - Lousewort
A boreal forest species, common in moist woods, sometimes rather dry peat sites, and an indicator of some bog ecosites.
Distinguished as follows:
- Stems branched, short lived perennial or biennial.
- Stems pubescent, 1-3 dm. tall.
- Lower leaves pinnately divided.
- Flowers rather few in upper axils and terminal spikes.
- Corolla about 12 mm. long, yellow, galea purplish.



Other Species:

1. ***Besseya wyomingensis*** (A. Nels.) Rydb. - Kitten-tails
A rather stiff and sometimes overlooked species of negligible forage value, found on dry, open slopes from foothills to alpine elevations. Restricted to southern regions, Cypress Hills, southern Rocky Mountains.
Distinguished as follows:
- Grey-hairy plants 1.5-3 dm. tall.
- Basal leaves prominent, ovate-oblong, often subcordate, 1.5-5 cm. long, on long stalks.
- Basal blades wavy-toothed.
- Cauline leaves small, bract-like, sessile.
- Flowers in dense spikes, on stalks to 5-20 cm. tall.
- Calyx not symmetrical, with 2 lobes.



- Corolla absent.
- Stamens 2, purple, exserted.
- Capsules hairy, oval, emarginate.

Habitat & Distribution: Common in the foothills and montane regions, occasional northward. Found in bogs, fens, often as associated with calcareous sites.

Forage Value: Poor to fair for the genus, larger, leafy species such as *P. bracteosa* more succulent and, as such, with superior palatability, often grazed by sheep and game; *P. groenlandica* is less palatable, and utilization to any extent an indication of a natural shortage of grazing or deteriorated range condition; *Pedicularis* species, overall, are often not prominent enough to furnish large quantities of forage, and as a result are usually classed as minor range plants.

Grazing Response: Increasers.

Notes: A large genus, with several hundred species; the generic name, from the Latin *pediculus*, a louse, ingestion of the plants at one time thought to infest cattle with lice; the common name of *P. groenlandica* applied because of the resemblance of the flowers to elephant heads; roots of louseworts can be eaten raw or cooked, and young tender stems used as pot herbs; as well, traditional uses by aboriginal people were numerous, infusions and baths known as a treatment for fevers, decoctions made from flower stalks taken as muscle relaxants and for their sedative effects, and the entire plant used to combat inflammatory diseases; some species supposedly had aphrodisiac powers and were used as a love charm; superstitious beliefs involving louseworts linked them to black magic and evil (perhaps because some species are mildly toxic due to an alkaloid content); although well known for their aesthetic appeal, most efforts to propagate the plants are unsuccessful due to an intricate and complex relationship between the semi-parasitic roots and the surrounding environment.

PENSTEMON - Beard-tongue

Common Characteristics

- Perennial herbs, a few species woody at the base.
- Leaves opposite.
- Flowers mostly in whorls.
- Calyx 5-lobed, divided to near base.
- Corolla tubular, upper lip 2-lobed, the lower 3-lobed, this well developed, equalling to exceeding the upper lip.
- Sterile stamen also present, about equal to the 4 fertile stamens, often bearded at or near top.
- Capsules cone-shaped to ovoid, with many net-veined angular seeds.

Key to Penstemon

1. Plants from subshrubby bases, prostrate/mat-forming; leaves ovate; flowers large and showy, 3-3.5 cm. long; subalpine-alpine. *P. ellipticus*

Plants entirely herbaceous; flowers less than 3 cm. long. 2

2. Flowers to 1 cm. long, in rather dense clusters at nodes and apex. 3

Flowers more than 1 cm. long, the clusters mostly rather loose. 4

3. Flowers blue; calyx obovate, bristle-tipped, slightly fringed. *P. procerus*

Flowers yellow; calyx lobes acuminate, distinctly fringed, pale-margined. *P. confertus*

4. Corolla white, broad-funnelform, glandular within. *P. albidus*

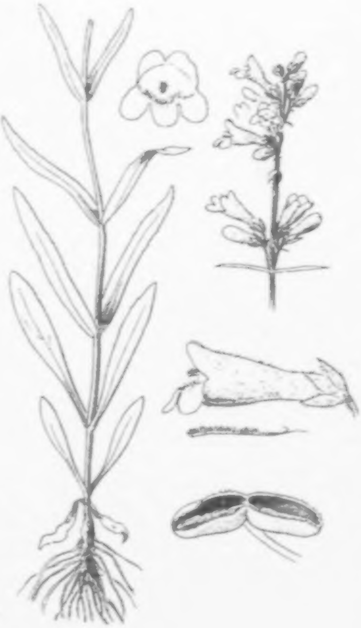
Corolla lilac-blue, not glandular within. 5

5. Leaves broad, firm, mostly entire, glaucous; lower bracts broadly ovate-orbicular; corolla blue, broad-funnelform. *P. nitidus*

Leaves linear-lanceolate, mostly toothed, thinner, not glaucous; lower bracts lanceolate; corolla narrower at the tip, lilac-pink. *P. gracilis*

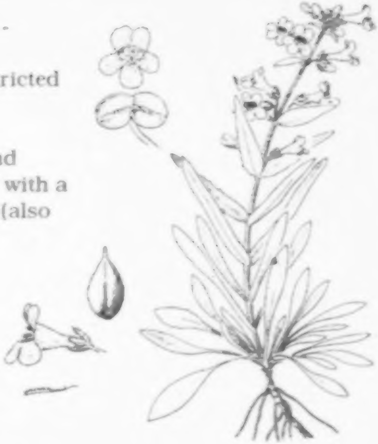
Penstemon gracilis Nutt. - Lilac-flowered Beard-tongue

Growth Habit:	Perennials from a branched caudex, stems 1-6 dm. tall, finely hairy and often stipitate glandular above.
Blades:	Lowest leaves narrowly lanceolate, short-petioled, to 10 cm. long, **entire to remotely callus-toothed**, often early withering; cauline blades linear-lanceolate, usually callus-toothed; blades glabrous to hairy, **glandular dotted**.
Inflorescence:	Flowers several, in verticils; pedicels and calyx glandular hairy, the calyx lobes ovate-lanceolate, sometimes scarious-margined; **flowers lilac to whitish, 18-20 mm. long, narrow and not expanded apically, glandular externally**; staminodia short-exserted, yellow-bearded for much of their length; capsules 4-8 mm. long.

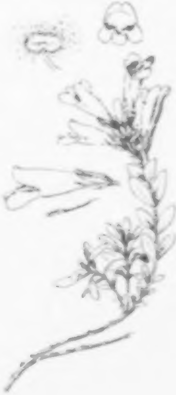


Similar Species:

1. ***Penstemon albidus*** Nutt. - White Beard-tongue
   A common species but restricted to the prairie region.
   Differs as follows:
   - Foliage more closely and consistently pubescent with a fine "felty" pubescence (also glandular upward).
   - Corolla pale violet to white (blackening when dry) glandular both internally and externally.
   - Corolla broadened apically, funnelform.



2. ***Penstemon ellipticus*** Coult & Fisher - Beard-tongue
   A Rocky Mountain species, rather common on rocky slopes in subalpine and alpine areas.
   Distinguished as follows:
   - Mat-forming plants with shrubby bases, 1-2 dm. tall.
   - Leaves rounded-elliptic, usually somewhat toothed.
   - Calyx glandular/viscid, with long pointed lobes.
   - Corolla showy, 3-3.5 cm. long, lilac-purplish, with throat widened.
   - Sterile stamen yellow-hairy, shorter than the fertile woolly anthers.



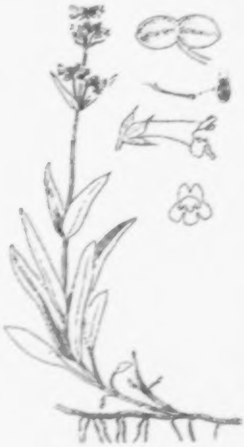
Habitat & Distribution: Frequent in the prairie and parkland areas. Found in open, dry, often sandy grassland.

Forage Value: Fair, the former two species falling somewhere between choice woody species such as *P. ellipticus/ fruticosa*, and the thick-leaved plants of rather negligible palatability.

Grazing Response: An increaser #1, fairly resistant to trampling, but penstemons as a group with reputed low germination rates even under optimum conditions, and populations consequently declining on heavily used range.

Notes: The specific name appropriately alluding to the graceful flowers; the primary value of many beard-tongues lies in their aesthetic qualities, our less common mountain species with especially large, spectacular flowers; many can be successfully transplanted into sites with shallow rocky soils.

Penstemon procerus Dougl. *ex* Grah. - Slender Blue Beard-tongue



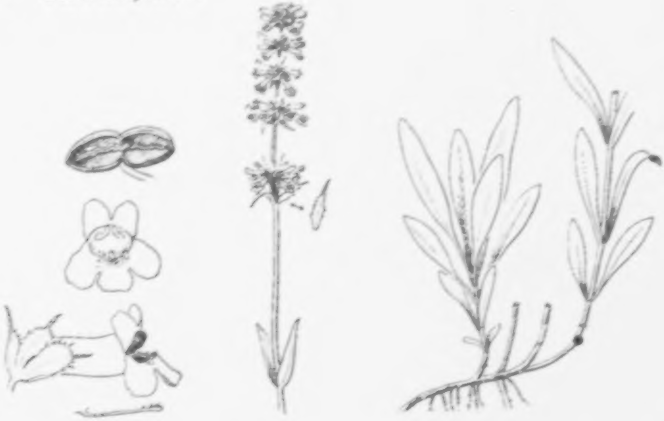
Growth Habit: Perennials, herbaceous, from a **woody elongate, pseudo-rhizomatous caudex**; stems few-several, somewhat tufted, **1-5 dm. tall, slender**, hairless or very finely hairy above.

Blades: Leaves **entire**, the lower **oblanceolate**, stalked; cauline leaves **lanceolate, stalkless above**; rosette, when present, with blades to 10 cm. long; foliage **hairless**.

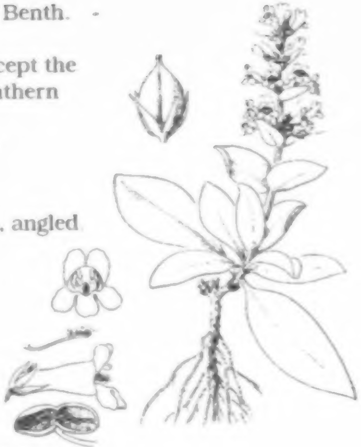
Inflorescence: Inflorescence **of several dense whorls**, this interrupted below, often continuous above; calyx about 5 mm. long, the lobes obovate, **slightly jagged-pale margined, abruptly long-pointed**; corolla **6-10 mm. long, deep purplish-blue**, the **tube narrow**, not abruptly widened nor strongly 2-lipped; sterile stamen bearded; capsules cone to egg-shaped, many seeded.

Similar Species:

1. ***Penstemon confertus*** Dougl. - Yellow Beard-tongue
   Found in moist grassland and meadows, open woods. Confined to southern regions, especially known as a species of open montane and foothills grasslands.
   Differs as follows:
   - Calyx tending to be more broadly pale and slightly more ragged-margined.
   - Flowers yellow.



2. ***Penstemon nitidus*** Dougl. *ex* Benth. -
Smooth Blue Beard-tongue
Common in all ecoregions except the boreal forest. Confined to southern areas. Found in dry prairie grassland, on exposed, often eroded slopes.
Distinguished as follows:
- Stems stout, 1-3 dm. tall, angled
- Plants hairless and conspicuously glaucous.
- Leaves thick, oval-lanceolate, not toothed.
- Bracts below flowers broad, oval, conspicuous.
- Corolla blue, often pink-tinged, to 18 mm. long.
- Corolla tube widened and broadly funnel-shaped.



Habitat & Distribution: Common in the foothills, montane and parkland regions, occasional elsewhere. Grows in open woods, moist meadow, fescue grassland, depressional grassland. Restricted to moister situations in the prairie region.

Forage Value: Fair, both *P. procerus* and *P. confertus* providing fair quality forage, moderately palatable to sheep, and occasionally eaten by cattle; thicker-leaved species like *P. nitidus* rank somewhat lower as range species, and subshrubby beard-tongues rate fairly high, being used as browse plants.

Grazing Response: Increasers #1, fairly resistant to grazing, but rely entirely upon seed for survival, and this has rather poor viability.

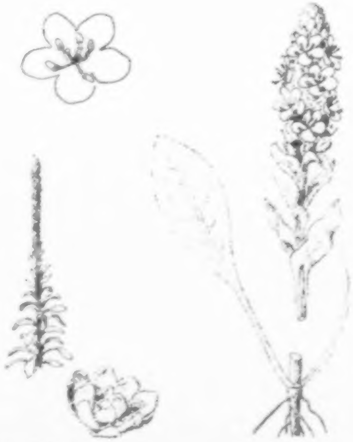
Notes: From the Greek *pente*, five, and *stemon*, thread, alluding to the five stamens, *procerus* means tall; beard-tongue is an obvious reference to the bearded sterile stamen; penstemons have been put to rather limited use by native people, the Blackfoot using decoctions for cramps and stomach pains and as a laxative, and teas were taken to stop vomiting; many beard-tongues are very attractive, both as ornamentals and in reclamation mixes, but are most successfully grown by transplanting, the poor seed viability possibly due to germ or seed coat dormancy.

VERBASCUM L. - Mullein

Common Characteristics

- Mostly biennial herbs from taproots.
- First year plants forming distinct rosettes.
- Blades basal, in rosettes, and cauline, alternate, simple, entire.
- Flowers in terminal spikes, racemes or panicles.
- Calyx of 5 nearly distinct sepals.
- Corolla rotate, mostly regular, usually yellow, 5-lobed.
- Stamens (4) 5, at least some of the filaments hairy.
- Stigma capitate.
- Fruit a subglobose capsule.
- Seeds numerous.

Verbascum thapsus L. - Common Mullein



Growth Habit: **Coarse taprooted biennial 10-20 dm. tall; stems densely grey-felty-pubescent with stellate hairs**, these sometimes rusty.

Blades: **First-year basal rosettes conspicuous**, these sometimes persisting into the second year; **basal blades oblanceolate**, 1-4 dm. long, gradually narrowed to a petiole; **cauline blades gradually reduced**, becoming sessile, with the leaf bases joined (decurrent) along the stems; **blades with dense pubescence like that of stems**.

Inflorescence: **Inflorescence a dense spike-like raceme 1-5 dm. long**, to 3 cm. thick; **calyx densely felty-pubescent**; flowers subsessile, **corolla yellow, 1-2 cm. wide**, with a short tube; **stamens 5**, exserted, all fertile, **the upper 3 villose** and shorter, the lower 2 glabrous, longer; capsules tomentose, globular, 7-10 mm. long; seeds with longitudinal ridges.

Habitat & Distribution: Introduced, rather common in the southern Rocky Mountains and foothills region. Grows on roadsides, in dry, open disturbed places.

Forage Value: Poor, the foliage distasteful and unattractive during all growth stages.

Grazing Response: An invader, becoming common in better moisture zones on disturbances, clear-cuts, along gravelly roadsides and trails; the species prefers shallow, rapidly drained soil and in these range types can become a problem weed when populations are left unchecked.

Notes: *Verbascum*, from the classical Latin name for the genus, *thapsus*, named for a town in Sicily, or possibly the isle of Thapsos (Magnise); the genus has a place among traditional medicinal plants, useful in treating coughs, colds and lung hemorrhaging, used by some native people to relieve lung congestion that typically followed their smoking rituals; infusions of flowers were taken to induce sleep and as an analgesic, and root mixtures used as a treatment for urinary tract problems; according to folklore, tying mullein leaves to the hands and feet was a supposed cure for malaria.

VERONICA L. - Speedwell

Common Characteristics

- Small annuals to perennials, roots fibrous to rhizomatous.
- Stems slender, reclining and rooting in some species.
- Leaves mostly cauline, opposite or uppermost alternate.
- Flowers small, white to blue, the calyx and corolla each 4-lobed, in terminal or axillary racemes or spikes, sometimes solitary in leaf axils.
- Corolla rotate, nearly regular, the upper lobe slightly larger.
- Stamens 2, exserted.
- Style slender, stigma capitate.
- Ovary flattened, becoming a compressed capsule, this often notched at the apex.

Key to Veronica

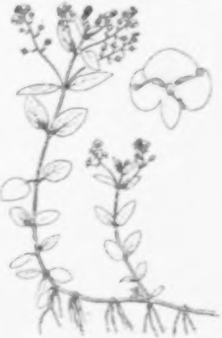
1. Annuals, flowers solitary in leaf axils. *V. peregrina*

Perennials, flowers several in terminal or axillary racemes 2

2. Racemes terminal, flowers in upper leaf axils; leaves sessile, mostly entire. *V. alpina*

Racemes axillary; glabrous plants with short-stalked leaves, mostly toothed. *V. americana*

Veronica americana (Raf.) Schw. - American Brooklime



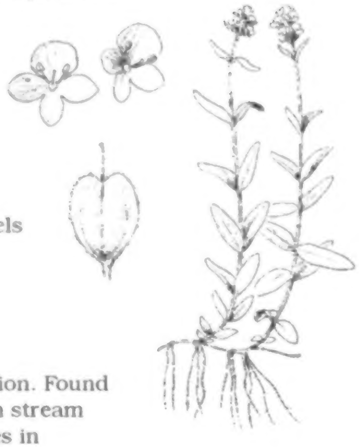
Growth Habit: Perennial from **creeping rhizomes; stems often reclining and rooting at the base**, ascending, glabrous, 1-6 dm. tall.

Blades: **Leaves all short-petiolate, ovate-lanceolate, shallowly serrate, 2-8 cm. long**, glabrous.

Inflorescence: **Racemes on long peduncles, axillary in upper axils**, drooping-spreading; calyx and corolla 4-lobed, flowers on long pedicels (to 1 cm. long), 5-10 mm. wide, **blue; stamens 2; capsules very shallowly notched**.

Similar Species:

1. ***Veronica alpina*** L. - Alpine Speedwell
Found in similar habitats, confined to the foothills and Rocky Mountain regions.
Differs as follows:
    - Leaves sessile, ovate-oblong, sometimes hairy.
    - Racemes terminal, pedicels to 4 mm. long.
    - Flowers to 5 mm. wide.
    - Capsules longer than wide, glandular.



Habitat & Distribution: Frequent except in the prairie region. Found in marshy and swampy places, on stream banks, around springs, sometimes in shallow water.

Forage Value: Poor, members of the genus deficient in terms of forage production.

Grazing Response: Increasers, but never with high cover values even when abundant.

Notes: The generic name of a somewhat complicated origin, commemorating St. Veronica who supposedly wiped Christ's face as He carried the cross to Calvary; this kerchief, according to legend, then bore a likeness to Christ's face, and over time this image was transferred to the "face" of *Veronica* flowers; supposed miraculous healing properties were then linked to the genus, although there appears to be little evidence to support this; a large genus, with more than 200 species, many of these desirable garden ornamentals.

Veronica peregrina L. ssp. ***xalpensis*** (HBK) Pennell. - Hairy Speedwell

Growth Habit: Fibrous-rooted **annuals**; stems 0.5-3 dm. tall, simple or branched, **glandular-pubescent**.

Blades: **Leaves 1-2.5 cm. long, sessile to subsessile, narrow** (linear-narrowly oblanceolate), entire to shallowly toothed, **sparsely glandular-pubescent**, at least below.

Inflorescence: **Flowers solitary in axils**, often occupying upper 1/2 of stems; flowers on **short pedicels**, alternate, subtended by a reduced leaf-like bract; **flowers white-pale blue, 2-3 mm. long, inconspicuous, capsules obocordate**, 3-4 mm. long, **shallowly notched, sparsely stipitate-glandular**.

Habitat & Distribution:	Frequent in most regions. Grows in wet meadows, swampy areas, on shores.
Forage Value:	Poor, diminutive and unproductive plants.
Grazing Response:	An increaser but a poor competitor except on disturbances and on soil with naturally sparse vegetation cover.
Notes:	The term speedwell has its roots in an old English tradition of bidding guests good-bye with the term, this perhaps derived from the spiritual connotations associated with the genus; *V. peregrina* is perhaps the homeliest member of the genus, small and frequently overlooked, but is nevertheless common and widespread, and to a limited extent, important as a ground cover species on moist disturbed soil.

OROBANCHACEAE - Broom-rape Family

Common Characteristics

- Herbaceous, often fleshy perennials, brownish to pinkish, lacking chlorophyll.
- Plants parasitic on roots, from underground, sometimes thickened caudices.
- Blades pale, bract-like.
- Flowers solitary or in spike-like clusters.
- Flowers gamopetalous, mostly perfect.
- Calyx 4-5-lobed.
- Corolla 5-lobed, generally 2-lipped.
- Stamens 4, with 2 longer.
- Ovary superior, 1-loculed, with 2-4 parietal placentae.
- Style solitary.
- Fruit a longitudinally dehiscent capsule.
- Seeds numerous, microscopic.

OROBANCHE L. - Broom-rape

Common Characteristics

- Brownish/pinkish herbs, root parasites.
- Plants from underground branched caudices.
- Blades pale, alternate, scale-like.
- Calyx 4-5 lobed.
- Corolla purplish, essentially 2-lipped, the upper lip 2-lobed (sometimes notched), the lower 3-lobed.
- Stamens on the corolla tube.
- Style elongate, with an enlarged capitate to disc-like stigma.
- Capsules 1-loculed, 2-3 valved.

Key to Orobanche

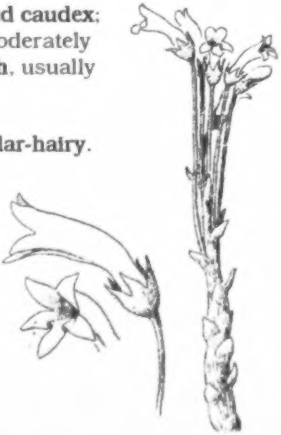
1. Flowers mostly sessile, numerous in a dense spike-like terminal cluster, each flower with a few bracts. *O. ludoviciana*

   Flowers solitary on long stalks, branches arising from a thick caudex; bracts below calyx absent. 2

2. Caudex soft, each branch with a single flower. *O. uniflora*

   Caudex firm/woody, usually forked, its branches with a few flowers, each on an erect stalk. *O. fasciculata*

Orobanche fasciculata Nutt - Clustered Broom-rape



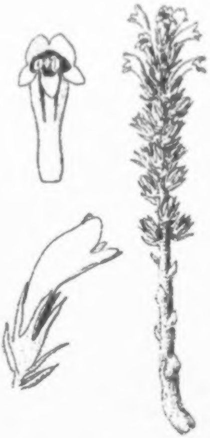
Growth Habit: Plants from a **thick, woody, usually forked caudex**; stems solitary or clustered, slender to moderately stout, **3-15 cm. tall, yellowish or purplish**, usually at least partially glandular-villose.

Blades: Blades usually several, **scale-like, glandular-hairy**.

Inflorescence: **Pedicels 4-10, each with a single flower, 2-15 cm. long, the lowest, or all originating from an approximate point and mostly equal**; calyx glandular-hairy, about 1 cm. long, **the lobes triangular; corolla 2-lipped, purplish, glandular-hairy, 2-3 cm. long, the lobes rounded-mucronate**; anthers glabrous to pubescent.

Similar Species:

1. ***Orobanche ludoviciana*** Nutt. - Broom-rape
   Occasional in the prairie and parkland regions. Parasitic on *Compositae*, especially *Artemisia* species.
   Differs as follows:
   - Inflorescence a dense terminal spike, the flowers sessile or the lowest short-stalked.
   - Calyx lobes longer-lanceolate.
   - Corolla somewhat smaller, 1.5-2 cm. long, purplish to yellowish-white, its lobes acute.



Habitat & Distribution: Occasional in all regions except the boreal forest. Grows in dry, open places in the foothills, in open prairie grassland. Parasitic on composites, especially *Artemisia* species, also apparently on *Eriogonum* species.

Forage Value: Poor.

Grazing Response: Increasers, although never abundant, the thick, woody root systems tolerant of considerable trampling and dry, exposed sites.

Notes: A curious genus with 100 or so members; from the Greek *orobos*, a clinging plant, and *ancho*, to strangle, alluding to the characteristic dependency of the plants on other species as their nutrient sources; *O. ludoviciana* was incorporated into the rituals of native people, plant material blown onto wounds by medicine men, with the supposed ability to cure the ailment; locally, our most attractive species, *O. uniflora* is rare at higher altitudes in the southern Rocky Mountains.

LENTIBULARIACEAE - Bladderwort Family

Common Characteristics

- Small carnivorous plants, semi-aquatic or of wet places.
- Plants annual to perennial, mostly with fibrous roots.
- Blades alternate, basal, or whorled, either well developed or reduced, often producing bladders.
- Leaves or bladders capable of trapping small crustaceans and insects.
- Flowers solitary or several in racemes at the ends of scapes or pedicels.
- Flowers gamopetalous, perfect, irregular.
- Calyx 2-5 cleft, often to near the base.
- Corolla deeply 2-lipped, spurred at the base.
- Stamens 2, attached near the base of the corolla tube, the anthers 1-loculed.
- Ovary superior, 1-loculed, with free central placenta and numerous ovules.
- Style short to obsolete, the stigma 2-lobed.
- Fruit a capsule, opening by 2 valves or irregularly bursting.
- Seeds numerous, small, wrinkled.

Key to Lentibulariaceae

1. Most leaves dissected, not in a basal rosette; flowers yellow; submersed plants. *Utricularia*

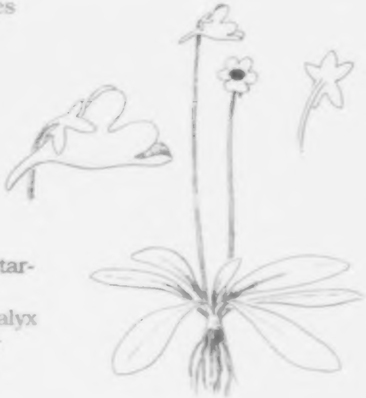
Leaves entire, in a basal rosette; flowers blue-purple; plants of wet places but rarely submersed. *Pinguicula*

PINGUICULA L. - Butterwort

Common Characteristics

- Fibrous rooted, terrestrial perennial herbs.
- Blades entire, well developed, in a basal rosette, elliptic-oval, short-stalked, 2-5 cm. long.
- Blades with upper surfaces sticky-secretory, the margins inrolled.
- Flowers solitary on bractless scapes.
- Calyx 5-lobed, then separated into an upper 3-lobed lip and a lower 2-lobed lip.
- Corolla 2-lipped, the upper 2-lobed, the lower 3-lobed, spurred, palate absent.
- Capsule 2-valved.

Pinguicula vulgaris L. - Common Butterwort



Growth Habit:	Fibrous rooted perennials, scapes 4-12 cm. tall, glabrous, **sticky**.
Blades:	**Leaves yellow-green**, elliptic-oval, 2-5 cm. long, **greasy-slimy above, succulent**, digesting small insects that are caught.
Inflorescence:	**Flowers purplish, violet-like, 1-2 cm. long, with a straight nectar-producing spur; corolla throat flaring-open, white-pubescent**; calyx with upper lip 3-lobed, the lower 2-lobed; corolla 2-lipped; fruit a 2-valved capsule.
Habitat & Distribution:	Common in the foothills and Rocky Mountain region, occasional northward. Found from low to subalpine elevations in moist boggy places, in fens and swamps, on shores, in mossy and wet rocky places. Primarily on wet calcareous soils, and an indicator of these conditions.
Forage Value:	Poor.
Grazing Response:	Increasers.
Notes:	From the Latin *pinguis*, fat, this as well as the common name because of the greasy, slimy appearance of the leaves; a circumpolar species, butterwort is well equipped for survival in nutrient-poor bogs with leached or saturated soil: plants have the unique ability to manufacture their own nitrogen by dissolving small insects that become trapped on their sticky leaves; as well, the violet-like flowers are well adapted to ensure cross-pollination, nectar-seeking insects effective in transporting and depositing pollen in the process of probing into the spur for nectar; butterwort, along with other uniquely adapted species, is a valuable component of ecosites that typically have limited biodiversity due to habitat or nutrient limitations.

UTRICULARIA L. - Bladderwort

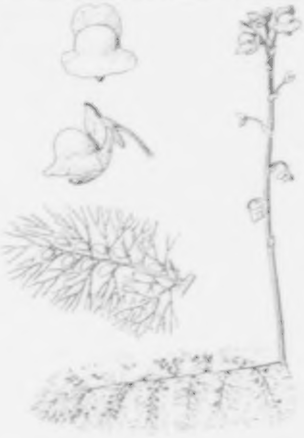
Common Characteristics

- Rootless or fibrous-rooted herbs.
- Blades alternate or whorled, entire or finely dissected.
- Submersed branches bearing valve-lidded bladders which trap small crustaceans and insects.
- Flowers each subtended by a bract, borne singly or a few in racemes at the end of an erect peduncle.
- Calyx 2-parted to near the base, the lobes entire.
- Corolla 2-lipped, the upper entire to 2-lobed, the lower entire to 2-lobed.
- Corolla spurred to saccate, the throat with a palate but closed.
- Capsules either indehiscent or variously dehiscent.

Key to Utricularia

1.	Leaves and bladders occurring on the same branch; stems 0.5 mm. broad or more.	*U. vulgaris*
	Leaves and bladders on separate branches; stems less than 0.5 mm. broad; associated with calcareous sites.	*U. intermedia*

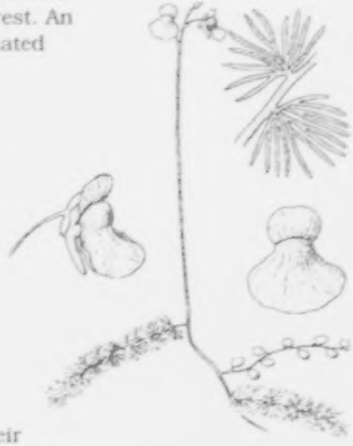
Utricularia vulgaris L. ssp. ***macrorhiza*** (Le Conte) Clausen - Common Bladderwort



Growth Habit:	**Submersed, free-floating plants near the water surface; peduncles stout, 0.5-1 mm. thick**, with a few bracts, rising well above water surface; submersed stems coarse.
Blades:	Foliage rather crowded on submersed branches, the leaves alternate, 1-5 cm. long, 2-parted at the base and **pinnately dissected into filiform, terete**, pointed **segments; bladders numerous, borne on the same branches as the leaves, 1-3 mm. wide**; winter buds ovoid-ellipsoid, 1-2 cm. long, with minute pubescent leaves.
Inflorescence:	Flowers on peduncles 6-20 cm. long, usually several; **calyx and corolla 2-lipped; flowers 14-20 mm. long, yellow with brown stripes on the palate**; the proper tube short, **the spur well developed**, directed forward; pedicels in fruit recurved.

Similar Species:

1. ***Utricularia intermedia*** Hayne - Flat-leaved Bladderwort
Occasional in west-central foothills, and throughout the boreal forest. An indicator of graminoid-dominated fens, these often somewhat calcareous. Distinguished as follows:
    - Stems slender, less than 0.5 mm. thick.
    - Leaves and bladders on separate branches.
    - Leaves serrate.



Forage Value: Poor, and in most cases unavailable to grazing animals.

Grazing Response: Increaser forbs by strict definition, although because of their aquatic habitat, are often not impacted by and thus do not respond to grazing intensities.

Notes: The generic name, from the Latin *utriculus*, bag, in reference to the air-filled, floating bladders; unable to obtain nitrogen from the soil, the plants have adapted their own specialized devices: the bladders open by hair-like valves, then are stimulated to close over small crustaceans and insects, digesting them, and in doing so, obtaining the protein necessary for survival; the flower structure is also well adapted to ensure cross-pollination, the weight of the visiting insect effective in opening the palate and thus exposing the stamens and pistil.

PLANTAGINACEAE - Plantain Family

Common Characteristics

- Perennial or annual herbs with fibrous roots or more often taproots.
- Plants stemless, leaves basal, simple, entire to shallowly toothed, often with prominent nerves.
- Inflorescence a spike, this on a long stalk.
- Flowers mostly perfect, regular, calyx and corolla 4-lobed; flowers small, pale.
- Calyx lobes pale-margined, sometimes with 2 longer.
- Corolla pale or pale-margined, salverform, the throat constricted.
- Stamens 2 or 4, attached to corolla tube, alternate its lobes.
- Fruit a capsule.

Key to Plantago

1. Small annual plants with linear (less than 5(7) mm. wide) leaves; foliage silky-hairy. 2

Perennials with broad leaves mostly over 10 mm. wide; pubescence variable but not silky. 3

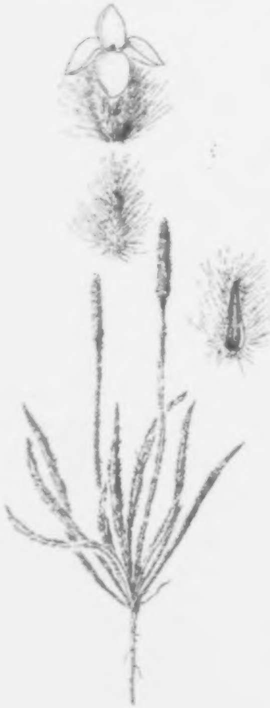
2. Woolly, silvery plants, leaves over 1 mm. wide; stamens 4; corolla lobes spreading, about 2 mm. long. *P. patagonica*

Plants hairy but not densely silvery-woolly; leaves very narrow, under 1 mm. wide; stamens 2; corolla lobes more erect, to 1 mm. long. *P. elongata*

3. Plants with conspicuous red-brown wool at crown; leaves ascending, lanceolate, gradually narrowed at the base; seeds 2-4 per capsule; native. *P. eriopoda*

Plants without conspicuous wool at crown; leaves prostrate, ovate, abruptly narrowed at the base; seeds 5-22 per capsule, small; introduced. *P. major*

Plantago patagonica Jacq. var. ***patagonica*** - Pursh's Plantain



Growth Habit: Taprooted **annual**, flower stalks **slender, 5-20 cm. tall, woolly-long-hairy.**

Blades: Leaves **linear-narrowly oblanceolate**, the tips pointed, tapering to a short stalk, **3-10 cm. long, 1-7 mm. wide**, broader leaves clearly **3-nerved**; **long woolly-hairy**.

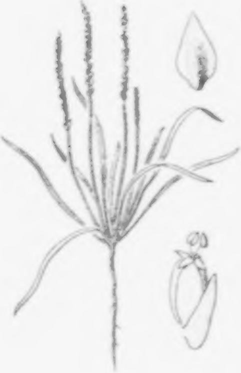
Inflorescence: Inflorescence (bracts, calyx, flower stalks) **woolly-hairy**; spikes dense, blunt, **1.5-10 cm. long**, narrow; bracts linear, **not much longer than flowers**; corolla lobes distinctly reflexed, **about 2 mm. long**; stamens 4; capsules splitting at about the middle; seeds **2 per capsule**.

Related Species:

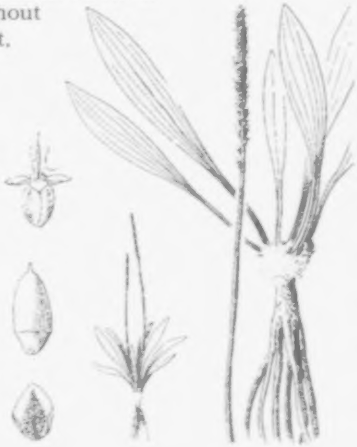
1. Var. ***spinulosa*** Gray
   Found throughout the range of the species.
   Differs as follows:
   - Bracts elongate, rigid, about 1 cm. long, conspicuously projecting beyond flowers, giving them a prickly appearance.

Similar Species:

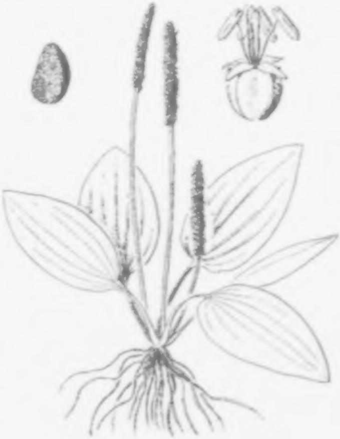
1. ***Plantago elongata*** Pursh ssp. ***elongata*** - Linear-leaved Plantain
   Also found in the southern prairie region on dry to somewhat depressional alkaline areas. Not as abundant as *P. patagonica*.
   Differs as follows:
   - Small, 2-8 cm. tall.
   - Plants less densely hairy, and rough coarse-hairy rather than woolly-long-hairy.
   - Leaves very slender, not exceeding 1 mm. in width.
   - Corolla lobes not more than 1 mm. long, more or less erect.
   - Stamens 2.



2. ***Plantago eriopoda*** Torr. - Saline Plantain
   Occasional, scattered throughout most regions. Grows in moist, depressional saline and alkaline areas.
   Distinguished as follows:
   - Plant crown covered with thick brownish wool.
   - Plants stout, sparsely hairy, 2-5 dm. tall.
   - Leaves fleshy, ovate-oblanceolate, gradually tapered to a stalk, 5-20 cm. long.
   - Flower spikes 5-20 cm. long.
   - Seeds 2-4 per capsule, about 2 mm. long.



3. ***Plantago major*** L. - Common Plantain
   Introduced perennial weed, rather common in waste places, lawns, along roads and trails. Rarely a problem in rangeland.
   Differs from *P. eriopoda*:
   - Plants somewhat hairy below but not conspicuously and densely brown-woolly in the crown.



- Blades tending to lie flat on the ground, and broader (ovate), abruptly narrowed to the stalk.
- Blades often larger, to 3 dm. long.
- Seeds more numerous, 5-22 per capsule, and smaller, about 1 mm. long.

Habitat & Distribution: Common but rather restricted in its range to the prairie region. Grows in dry, often sandy grassland, on open, eroded slopes, sometimes in open depressional areas.

Forage Value: Poor, this and other small plantain species providing little forage and also unpalatable.

Grazing Response: Increasers, germinating readily on exposed soil on disturbances and overgrazed range; although native plantains are seldom in such abundance as to be considered troublesome, significant populations usually indicate deteriorated conditions.

Notes: From the Latin *planta*, foot, referring to the leaf shape of some species; larger, more leafy species are nutritious, especially high in vitamins C, A, and K, the leaves eaten both raw and cooked; also regarded as medicinally important, leaves were applied as poultices to wounds and bruises, on swellings, stings, bites and boils, and are possibly effective on snake bites; taken internally, plantain was used as a diuretic, to regulate stomach acids in the treatment of ulcers, and roots were chewed to relieve toothaches; annual plantains are of rather limited value in reclamation due to their small size and shallow root system, but are nevertheless of some value in revegetating denuded sites; *Plantago eriopoda* is of particular interest because of its more extensive perennial root system, and because it inhabits moist saline and alkaline soils that are often sparsely vegetated.

RUBIACEAE - Madder Family

Common Characteristics

- Stems 4-sided.
- Leaves simple, entire, opposite or whorled.
- Stipules small to obsolete or enlarged, leaf-like.
- Flowers small, in terminal or axillary cymes.
- Flowers mostly perfect, the segments united.
- Calyx present or obsolete, corolla small, saucer-shaped, or funnel-shaped, usually white, 4-lobed (or 3-lobed in one species).
- Stamens 4 (3), alternate the corolla lobes.
- Fruit dry, of 2 rounded nutlets, each 1-seeded (sometimes bristly-hairy) or a splitting capsule.

GALIUM L. - Bedstraw; Cleavers

Common Characteristics

- Stems 4-angled to square, reclining to erect, roots various, often creeping.
- Leaves (including stipules) whorled.
- Flowers as described above, calyx obsolete.
- Fruit of 2 rounded, non opening 1-seeded nutlets.

Key to Galium

1. Leaves in whorls of 6; woodland species. *G. triflorum*

Leaves in whorls of 4; habitat variable. 2

2. Erect plants 2-7 dm. tall; leaves firm, 3-nerved; ovary hairy; upland plants. *G. boreale*

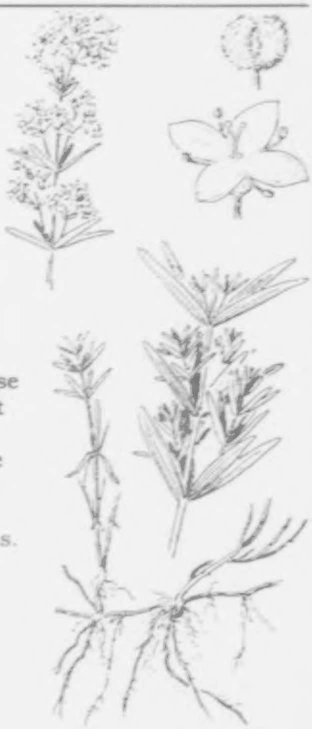
Weak/reclining plants 1-3 dm. tall; leaves 1-nerved; ovary glabrous; small wetland plants. 3

3. Corolla 4-lobed; stems smooth; leaves reflexed, midrib smooth. *G. labradoricum*

Corolla 3-lobed; stems scabrous; leaves spreading, midrib scabrous. *G. trifidum*

Galium boreale L. - Northern Bedstraw

Growth Habit:	Perennials **from well-developed rhizomes; stems square, branching**, usually finely roughened and finely hairy just below or at nodes, **2-7 dm. tall**.
Blades:	Leaves **linear-lanceolate, stalkless, 2-4.5 cm. long, strongly 3-nerved, in whorls of 4**; blades finely roughened above and on nerves below; secondary (and smaller) ones often present in axils.
Inflorescence:	Cymes in **showy, terminal, rather dense panicles**; corolla **4-lobed, white, about 2 mm. long, pleasantly fragrant**; fruit **small (2 mm. long), in pairs, with fine hairs** (these not hooked).
Habitat & Distribution:	Very common throughout most regions. Found in open woods, in fescue grassland, in meadows. In driest regions restricted to depressional, wooded and snow melt areas, moist coulees.



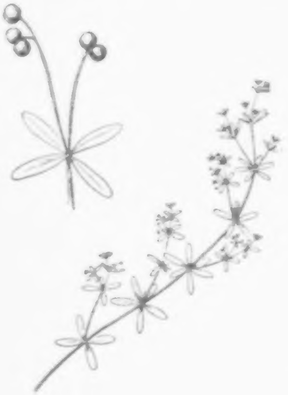
Forage Value: Poor, practically worthless as a grazing species, rarely utilized by cattle, sometimes used by sheep.

Grazing Response: An increaser and indicator of overgrazing, spreading rather readily by rhizomes, and usually left ungrazed to produce a seed crop.

Notes: From the Greek, *gala*, milk (the bruised foliage of *G. verum* once used to curdle milk in cheese making), *boreale*, a reference to its northern (and circumpolar) distribution; the common name was given as members of the genus were used to stuff mattresses; *Rubiaceae* is an economically important family, including *Cinchona* from which quinine is obtained, as well as coffee (*Coffea*), *G. boreale* seeds sometimes ground as a coffee substitute; young shoots were also eaten but plants were primarily used by native people in the production of a red dye from the roots (sometimes combined with cranberries), used in dyeing porcupine quills; the sweet-scented flowers of some species were also used as perfume; *G. boreale* is of some value as it naturally stabilizes disturbed soil, and although a worthless range plant, has a place in the ecosystem as a native early phase species and can be recommended for reclamation on this basis.

Galium trifidum L. ssp. ***trifidum*** - Small Bedstraw

Growth Habit: Perennials from very slender rhizomes; **stems fine, slender, often reclining and tangled, minutely scabrous**, at least on angles, otherwise glabrous, 1-3 dm. long.



Blades: Leaves small, **6-14 mm. long, linear-oblanceolate, in whorls of 4, spreading but not reflexed**, 1-nerved; **blades finely scabrous on midrib below and on margins**, otherwise glabrous.

Inflorescence: Flowers 1-3 in leaf axils and also terminal, **the pedicels filiform** and spreading-arching; **flowers small, whitish, to 1.5 mm. long, corolla 3-lobed**; fruit rounded, glabrous, to 1.75 mm. long, the 2 nutlets distinct and well separated.

Similar Species:

1. ***Galium labradoricum*** Wieg. - Bedstraw
   Found in much the same habitat but less common and absent from southern regions. Especially known as a species of fens.
   Differs as follows:
   - Stems not scabrous, sometimes sparsely pubescent.
   - Leaves usually reflexed.
   - Leaves not scabrous on margins and midvein but margins sometimes with some ciliate hairs.
   - Corolla 4-lobed.

Habitat & Distribution: Frequent except in the prairie region. Found in moist to wet places: in bogs, marshy areas, in moist woods and thickets, on stream banks.

Forage Value: Poor, both species diminutive and of no importance as range plants.

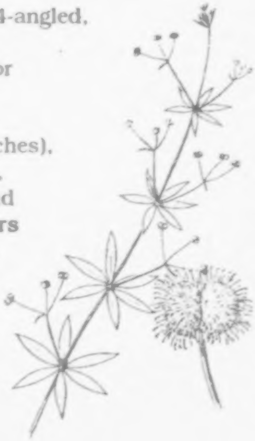
Grazing Response: Increasers.

Notes: As suggested by the Latin *trifidum*, the species is unique among dicots as it typically has only three petals; our small bog bedstraws are often overlooked, also rarely viewed as having any significance; however, these and other similar species can be valued because they are common components of bogs and marshes, thus do contribute to some extent to the overall well-being and diversity of these ecosites.

Galium triflorum Michx. - Sweet-scented Bedstraw

Growth Habit: Perennials from creeping rhizomes; stems 4-angled, **remotely hooked-scabrous along angles**, 2-8 dm. long, prostrate-ascending, simple or somewhat branched.

Blades: **Leaves in whorls of 6** (4-5 on smaller branches), **narrowly elliptic to oblanceolate**, cuspidate, **1.5-4.5 cm. long**, 1-nerved; blades green and **glabrous except for a few stiff scabrous hairs on margins and midrib beneath**, as well as sparingly on upper surface; foliage with a pleasant sweet odor.



Inflorescence:	Cymes axillary and terminal, peduncles 3-flowered, or again branched; **peduncles and pedicels spreading-divergent; flowers greenish-white, the corolla 4-lobed, 2-3 mm. wide**; nutlets 2-3 mm. long, the segments closely approximate, **covered with hooked bristles**.
Habitat & Distribution:	Common in all regions except the prairies. A woodland species, found in moist woods and thickets, prefers at least moderate soil fertility and mesic-subhygric conditions..
Forage Value:	Poor, (as for the whole genus).
Grazing Response:	Increasers in wooded regions.
Notes:	As the common name implies, the flowers were dried by some aboriginal people for use as perfume and in making bedding and mattresses; somewhat similar to and sometimes misidentified as the introduced and weedy cleavers (*G. aparine*), *G. triflorum* is seldom aggressive under normal circumstances.

VALERIANACEAE - Valerian Family

Common Characteristics

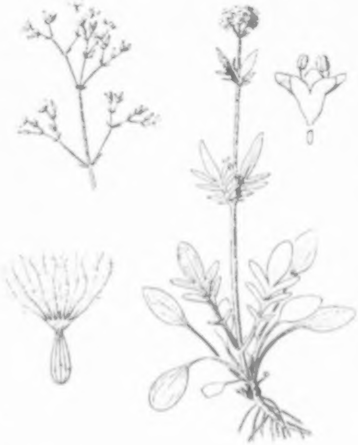
- Perennial herbs, roots variable, these distinctly scented.
- Leaves basal and cauline, opposite, all or some pinnately cleft; exstipulate.
- Flowers in paniculate cymes.
- Flowers perfect to unisexual, gamopetalous, epigynous.
- Calyx involute and inconspicuous, becoming enlarged, composed of several plumose bristle-like segments.
- Corolla 5-lobed, small, pink or white.
- Stamens 3, ovary inferior, 3-carpellary, with 2 of these non-functional; stigma 3-lobed.
- Fruit a dry, 1-seeded achene, with 3 nerves on one side, 1 on the other; calyx persistent on fruit as a plumose "pappus".

VALERIANA L. - Valerian

Key to Valeriana

1.	Basal leaves 3-5 divided; stem leaves with 3-7 leaflets; corolla 5-8 mm. long.	*V. sitchensis*
	Basal leaves often toothed but not divided; stem leaves with 9-15 leaflets; corolla to 3 mm. long.	*V. dioica*

Valeriana dioica L., ssp. ***sylvatica*** (Rich.) F.G. Mey - Northern Valerian



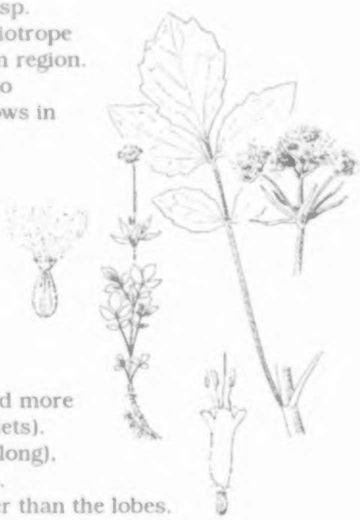
Growth Habit: Perennials with a branching caudex or short rhizome, also with abundant fibrous roots; stems mostly glabrous, **3-6 dm. tall**.

Blades: **Basal blades** well developed, **simple and mostly entire to wavy-margined, 2-5 cm. long, elliptical to lanceolate-oblanceolate**, glabrous, long-petiolate; **cauline leaves** short stalked-subsessile, mostly 2-4 pairs, **9-15 pinnatifid, the lobes entire, the lateral smaller and narrower than the terminal, this ovate-oblong**.

Inflorescence: Inflorescence compact at first, **elongating and diffuse in fruit; flowers 5-lobed, the corolla white, 1-3 mm. long, rotate**, the tube only slightly longer than lobes; **calyx pappus-like in fruit**, the segments 9-15, achenes 3-5 mm. long.

Similar Species:

1. ***Valeriana sitchensis*** Bong. ssp. ***sitchensis*** - Mountain Heliotrope
   Found in the Rocky Mountain region. More restricted to montane to subalpine areas, where it grows in moist meadows and woods.
   Differs as follows:
   - Larger, more robust plants, to 10 dm. tall.
   - Blades larger and broader.
   - Basal blades mostly all pinnately divided into 3-5 ovate-obovate segments.
   - Cauline blades larger and more numerous (with 3-7 leaflets).
   - Corolla larger (5-8 mm. long), often pink-purple-tinged.
   - Corolla tube much longer than the lobes.



Habitat & Distribution:	Frequent in the foothills/Rocky Mountain region, also in the boreal forest. Found in boggy places, depressional meadows, sometimes associated with somewhat acidic, lower slope black spruce sites.
Forage Value:	Fair, the genus as a whole fairly productive, also moderately palatable and nutritious; *V. sitchensis*, in particular, is often rather extensively utilized, the entire plant grazed early in the season, by mid-summer the leaves and flower heads cropped.
Grazing Response:	Increasers, the substantial root system resistant to at least moderate trampling, capable of good recovery unless severely overgrazed.
Notes:	Syn. *V. septentrionalis*; a widespread genus of about 200 species; the generic *Valeriana* is thought to originate with a Roman Valerius, who apparently used the root as medicine, also can be traced to the Latin term *valere*, to be in good health; valerian has a world-wide status as a medicinal herb, known as an antispasmodic, and is one of our most effective herbal nerve/ antidepressant medicines, used alone or in combination with other species to cure insomnia, irritability and migraines; decoctions of *V. dioica*, specifically, were at one time used to cure upset stomach as well as colic and distemper in horses; *V. sitchensis* was sometimes a component of tobacco mixtures used in various smoking rituals.

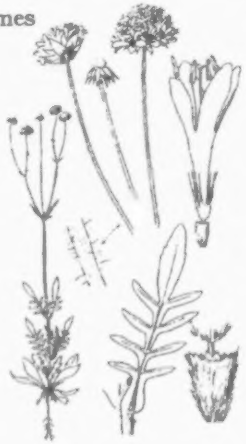
DIPSACACEAE - Teasel Family

Common Characteristics

- Biennial or perennial herbs.
- Foliage rough-hairy.
- Leaves opposite to whorled.
- Flowers usually in dense involucrate heads.
- Flowers mostly irregular, perfect.
- Calyx small, deeply 4-5 cleft, or with more numerous hair-like divisions.
- Corolla 4-5 lobed, more or less 2-lipped.
- Stamens 2 or 4, not united.
- Fruit dry.

KNAUTIA L. - Blue Buttons

Knautia arvensis (L.) Duby - Field Scabious; Blue Buttons



Growth Habit: **Stout perennials from taproots and sometimes branched caudices**; stems erect, with **roughened short and longer hairs, often purple-spotted, 4-10 dm. tall.**

Blades: Leaves **opposite**, the **lowest coarsely toothed**, the **cauline deeply pinnately divided** into lanceolate lobes, reduced above; leaves up to 2.5 dm. long, moderately hairy **with short and longer roughened hairs**.

Inflorescence Flowers resembling those of *Compositae*, **small, in dense heads 1.5-4 cm. wide, borne at the ends of a few long naked branches**; involucre bracts **herbaceous, ovate-lanceolate**, 10-15 mm. long, hair fringed; calyx **3-4 mm. long, cup-shaped**, with about **8 bristle-like awns**; corolla **funnel-shaped, 9-12 mm. long, 4-lobed**, the marginal ones larger than the central, **lilac-purple**; fruit **an achene 4-5 mm. long and 4-angled, densely hairy.**

Habitat & Distribution: An introduced noxious weed, especially common in western regions.

Forage Value: Poor, unpalatable to livestock and game.

Grazing Response: An invader, European in origin, now well established in southwestern Alberta and becoming common in waste areas, in cultivated fields (probably sometimes established as a contaminant in seed) and now moving onto rangeland; field scabious has a deep, fleshy taproot that stores abundant food reserves, also produces fair quantities of viable and easily wind and water-dispersed seed which gives the species a competitive advantage both in disturbed places and in native pastures; once established, eradication can be difficult.

Notes: Named for Christian Knaut, 1654-1716, a German physician and botanist; *arvense* means field.

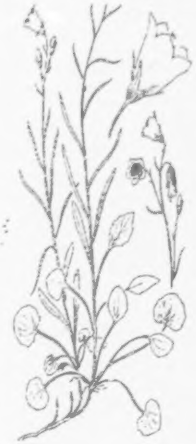
CAMPANULACEAE - Bluebell Family

Common Characteristics

- Taprooted or rhizomatous perennials with milky juice.
- Leaves alternate, simple.
- Flowers in panicles or racemes, sometimes solitary.
- Flowers regular, perfect.
- Calyx and corolla each 5-lobed, corolla showy, blue-purple, bell-shaped to funnel-shaped.
- Stamens 5.
- Fruit a capsule, opening by lateral pores.
- Seeds numerous, smooth.

CAMPANULA L. - Bluebell; Harebell

Campanula rotundifolia L. - Bluebell; Harebell



Growth Habit: Perennials from a **taproot and branching, almost rhizomatous caudex**; stems **slender** but erect, **1-6 dm. tall**, mostly hairless, **juice milky**.

Blades: Basal **blades ovate, often cordate, usually toothed, long stalked, to 2 cm. long**; basal leaves usually withered by flowering time, but sometimes forming mats; cauline leaves **often numerous, linear to narrowly lanceolate, less than 1 cm. wide**, ascending; leaves hairless.

Inflorescence: Flowers **several** in a loose raceme or panicle, erect to nodding on slender stalks; calyx **hairless**, the lobes 4-12 mm. long; flowers blue, **bell-shaped, 1.5-2.5 cm. long**, the lobes much shorter than the tube; capsules nodding, 5-8 mm. long, opening near the top; seeds very small, numerous.

Habitat & Distribution: Common in most areas, absent from parts of the northern boreal forest. Found in variety of habitats: in fescue grassland, open woods, on hillsides and rocky slopes at higher elevations, in moist or depressional areas in driest regions. Known as a species of stony fluvial flats in western areas.

Forage Value: Poor, the plants little-used by livestock.

Grazing Response: An increaser, spreading to some extent vegetatively and producing an abundance of viable seed; however, the species seldom displaces more valuable forage in native grasslands to the extent of becoming problematic.

Notes: The generic name in Latin translates little bell, *rotundifolia* means rounded leaves; the common term harebell is actually misspelled, the correct word hairbell, a reference to the hair-like leaves; although it produces a small amount of herbage, *Campanula rotundifolia* was a source of food for various native peoples, the foliage eaten raw or boiled, and the roots boiled; as with its alpine relatives, *C. rotundifolia* is very attractive and is a welcome addition to native flower gardens, also recommended as an early successional species for reclamation, often a natural pioneer on disturbed and especially stony and shallow soils.

COMPOSITAE - Composite Family

Common Characteristics

A large and diverse family, with a complex and widely varying floral structure. Characteristics common to most members of the family can be summarized as follows:

- Flower heads composed of many small flowers on a common receptacle, below which is an involucre of bracts (true calyx absent).
- Chaffy bracts often present on receptacle and among florets.
- Individual flowers varying: perfect to unisexual, regular to irregular.
- Stamens 5, the anthers united into a tube (separate in one small group), stamens alternating corolla lobes.
- Ovary inferior.
- Fruit an achene, this sometimes unappendaged but more often with a scaly or hairy pappus attached to the top (considered a modified calyx).
- Achenes in some species enclosed in an involucre, this bur-like.
- Flowers of two types:
    1. Tubular or disc flowers, these small, with a regular, 5-lobed corolla.
    2. Ligulate or ray flowers, these usually more showy, irregular, with a single strap or ray, this sometimes toothed.
- Flower heads of three main types:
    1. Flowers all ligulate.
    2. Flowers radiate, with tubular flowers central and ray florets around the margin.
    3. Flowers discoid, of tubular flowers only.

Key to Compositae

1.	Flowers all ligulate (ray), perfect; juice milky.	Group I
	Flowers not all ligulate; juice watery.	2
2.	Heads radiate (both types of flowers).	3
	Heads discoid (tubular flowers only).	5
3.	Rays white, blue or purple.	Group IV
	Rays yellow or orange.	4
4.	Pappus fine and hair-like.	Group II
	Pappus firm, of awns, chaff, sometimes none.	Group III

5. Pappus of fine, hair-like bristles. Group V

Pappus firm, of awns or chaff. Group VI

GROUP I (Flowers all ligulate, perfect; juice milky).

1. Leaves few, small, linear, scale-like; flowers pink; plants of dry habitats. *Lygodesmia*

Leaves not as above; flowers various but not pink. 2

2. Heads solitary, plants dandelion-like but with uniseriate involucre and stem leaves (narrow) present, pappus bristles plumose at maturity. .... *Tragopogon*

Involucre of 2 or more series, pappus not plumose. 3

3. Stems leafless, all blades basal; heads solitary. 4

At least some stem leaves present; heads usually more than one. 6

4. Bracts in 2 distinctly unequal series; achenes 4-5 nerved, the upper part spiny. *Taraxacum*

Bracts in several series, often overlapping; achenes about 10-ribbed, not spiny-roughened above. 5

5. Leaf margins without longer, ciliate hairs; widespread. *Agoseris*

Leaf margins distinctly villose-ciliate with longer white hairs; restricted to southern prairies. *Nothocalais*

6. Achenes twice as wide as thick, flattened; flowers yellow or blue. 7

Achenes not flattened; flowers yellow (rarely white or orange). 8

7. Achenes beaked; flowers blue; native. *Lactuca*

Achenes not beaked; flowers yellow; introduced weeds. *Sonchus*

8. Annuals or taprooted perennials; lower stems and leaves in some species glabrous; involucre bracts mostly in one row (usually an outer short series); pappus whitish. *Crepis*

Perennials from fibrous roots; lower stems and leaves usually long hairy; involucre bracts usually in more than one series and overlapping; pappus usually tawny. *Hieracium*

GROUP II (Heads radiate, the rays yellow or orange; pappus mostly fine, hair-like; receptacle without bristles or scales).

1. Leaves opposite. *Arnica*

Leaves alternate or basal. 2

2. Plants with several ascending stems, the foliage rather conspicuously long-white hairy, pappus of 2 different series, the inner brownish, fine, hair-like, the outer of short scales. *Heterotheca*

Pappus sometimes of unequal bristles but not of 2 dissimilar series. 3

3. Involucre bracts in 1 series, narrow, mostly equal except for often a few very short outer ones. *Senecio*

Involucre bracts in several series, overlapping. 4

4. Plants with fibrous roots; leaves not spiny; flowers relatively small (largest involucres to 6 mm. high). *Solidago*

Plants with taproots; leaves spiny in some species; flowers large. *Haplopappus*

GROUP III (Heads radiate, rays yellow or orange, pappus firm, of awns, chaff, sometimes none).

1. Plant bases woody; leaves linear, glandular-pitted; bracts glandular-sticky; flowers small (rays to 3 mm. long). *Gutierrezia*

Flowers mostly large and showy (rays well over 3 mm. long). 2

2. Stem blades lacking or reduced to bracts. 3

Stem leaves well developed. 4

3. Leaves long-stalked, triangular, large (to 15 cm. wide). *Balsamorhiza*

Leaves not long-stalked, oblanceolate, to 1 cm. wide. *Hymenoxys*

4. Bracts in 2 distinctly dissimilar series. 5

Bracts more or less the same. 6

5. Receptacle naked; stems to 2 dm. tall; leaves glandular dotted; plants of dry places. *Hymenoxys*

Receptacle chaffy; stems taller; plants of moist places. *Bidens*

6. Receptacle naked; rays either distinctly 3-lobed or involucre sticky. 7

Receptacle chaffy/bristly; rays mostly not distinctly 3-lobed, involucre not sticky. 8

7. Involucre not resinous; rays reflexed, conspicuously 3-lobed. *Helenium*

Involucre sticky-resinous; rays spreading to erect, entire. *Grindelia*

8. Leaves (at least lower) opposite; sunflowers. *Helianthus*

Leaves alternate. 9

9. Rays purplish at base. *Gaillardia*

Rays yellow. 10

10. Rays few (3-7); receptacle elongated-cone-like. *Ratibida*

Rays more than 7; receptacle flattened. 11

11. Leaves entire or toothed and often stiff-rough hairy; disc dark purplish or brown; native; sunflowers. *Helianthus*

Leaves much dissected; disc yellow; introduced weed. *Anthemis*

GROUP IV (Heads radiate, rays not yellow or orange).

1. Plants with the following combination of characteristics: taprooted,either with a solitary head on a stalk to 20 cm. tall, or stemless,heads not much elongated beyond basal leaves; blades mostly in basal rosettes, linear to spatulate; rays white to blue; achenes angular, hairy; of dry slopes. *Townsendia*

   Plants not with above combination of characteristics. 2

2. Pappus at least partially of capillary bristles. 3

   Pappus a crown, of 1-2 awns or absent. 6

3. Leaves mostly basal, large, their bases cordate to arrow-shaped; plants of moist to wet places. *Petasites*

   Leaves cauline and basal, not cordate or arrow-shaped; habitat variable. 4

4. Taprooted plants of dry places; leaves pinnately divided. *Machaeranthera*

   Roots various; leaves toothed to entire, never pinnately divided. 5

5. Leaves in most species primarily basal, peduncles with few/reduced leaves; involucre bracts never leafy and long and narrow, not with pale bases/green tips, equal or nearly so; rays mostly narrow, numerous; pappus mostly double (an outer short series), otherwise rather sparse; achenes about 2-nerved; often early-flowering. *Erigeron*

   Leaves often well developed along stems; involucre bracts sometimes with some leafy-green, elongate, sometimes pale at base or entire bract pale-thickened; bracts broader, often at least tips remaining green throughout season; bracts often in 2 or more series and unequal in length; rays usually fewer and relatively broad; pappus bristles numerous, simple; achenes mostly several-nerved, sometimes pubescent; usually late-flowering. *Aster*

6. Rays white. 7

   Rays pink or purple. 9

7. Leaves not finely dissected, usually oblanceolate and toothed; heads solitary, large (4 cm. broad). *Chrysanthemum*

   Leaves finely divided; heads several, smaller. 8

8. Head with numerous rays 5-16 mm. long; introduced, weedy. *Matricaria*

   Heads with few rays 2-5 mm. long; native. *Achillea*

9. Rays dark purplish; disc columnar. *Ratibida*

   Rays pink. *Achillea*

GROUP V (Heads discoid, pappus fine, hair-like).

1. Receptacle densely bristly. 2

   Receptacle naked. 5

2. Leaves without spiny margins. 3

Leaves with spiny margins 4

3. At least some bracts spiny or fringed. *Centaurea*

Bracts not spiny or fringed, may be cobwebby-hairy. *Saussurea*

4. Pappus bristles feathery-plumose. *Cirsium*

Pappus bristles not feathery-plumose; heads large, mostly solitary, nodding from long, mostly naked stalks. *Carduus*

5. Flowers all perfect, dark pink or yellow. 6

Flowers either all pistillate or the outer pistillate white to pale pink or tan-tawny. 7

6. Flowers pink; leaves not spiny-toothed. *Liatris*

Flowers yellow; leaves thick, grey-green and spiny-toothed. *Machaeranthera*

7. Leaves basal, their bases cordate or sagittate; plants of moist to wet places. *Petasites*

Leave not cordate or sagittate at base; habitat variable. 8

8. Basal leaves early deciduous; cauline not much reduced, green above, white-woolly below, often revolute; pistillate heads often with some central staminate flowers; montane species. *Anaphalis*

Stems, if leafy, with reduced leaves, not revolute; heads entirely dioecious; distribution variable. *Antennaria*

GROUP VI (Heads discoid, pappus not fine, hair-like).

1. Involucres without hooked prickles and spines. 2

Involucres with some hooked prickles or spines. *Arctium*

2. Receptacle hairy or naked. 3

Receptacle chaffy. 4

3. Leaves punctate, strongly aromatic; inflorescence flat-topped (in corymbs). *Tanacetum*

Leaves not both punctate and aromatic; inflorescence in racemes, panicles or spikes. *Artemisia*

4. Involucres less than 6 mm. high, flowers imperfect, pistillate and staminate in the same head; pappus absent. *Iva*

Involucres larger; flowers perfect; pappus present, the awns not always conspicuous; rays often present, yellow. *Bidens*

ACHILLEA L. - Yarrow; Milfoil

Common Characteristics

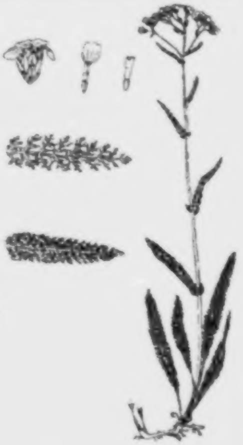
- Rhizomatous perennial herbs.
- Stems with alternate shallowly to deeply incised leaves, usually with some long hairs.
- Inflorescence of corymbs, with small radiate flowers.
- Bracts overlapping, pale-margined.
- Receptacle chaffy.
- Ligulate flowers rather few.
- Achenes compressed, with thick-callused margins, hairless.
- Pappus absent.

Key to Achillea

1. Leaves feathery, deeply 2 (3) times pinnate; rays about 5 per head, 2-3 mm. long; of upland sites. *A. millefolium*

   Leaves pectinately pinnate (comb-like); rays 6-12 per head, mostly 1-2 mm. long; of moist sites. *A. sibirica*

Achillea millefolium L. - Common Yarrow



Growth Habit: **Rhizomatous** plants with **aromatic foliage**; stems 3-8 dm. tall, ridged, **woolly-long-hairy**.

Blades: Leaves basal and cauline, only the lower stalked, **deeply 2-3 times pinnate (feathery) into narrow, pointed segments**, 4-10 cm. long.

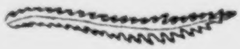
Inflorescence: Inflorescence **flat topped or rounded**; flowers with bracts 4-5 mm. long, rays **white (pink), 2-3 mm. long, about 5 per head**; disc flowers 10-30; achenes **compressed**, thick-margined, pappus **absent**.

Related Species:

1. Ssp. ***lanulosa*** (Nutt.) Piper
   Widely distributed.
   - Bracts pale.
   - Forma *lanulosa*: Rays white.
   - Forma *roseoides*: Rays pink.
2. Ssp. ***borealis*** (Bong.) Breitung
   Northern regions.
   - Bracts with dark margins.

Similar Species:

1. ***Achillea sibirica*** Ledeb. - Many-flowered Yarrow
   Common in boreal forest and parkland regions, occasional in the foothills. Grows in moist wooded areas, and is especially common on gravelly or muddy river banks.



Differs as follows:

- Leaves pinnately divided in a comb-like manner, the divisions sharply toothed.
- Rays more (6-12) per flower but generally smaller (1-2 mm. long), white.

Habitat & Distribution: Common in all regions. Grows in open grassland, in open woods and clearings, on slopes, on shores. Found in depressional areas, moist coulees, snow melt areas in driest regions, and, conversely, on mesic-subxeric sites in western areas.

Forage Value: Poor, palatability ratings vary from one region to the next, generally utilized rather sparingly by cattle and sheep, apparently less so by horses and game.

Grazing Response: An increaser, and indicator of overgrazing, very resistant to heavy trampling, often a major component of altered range along with Kentucky bluegrass and dandelion.

Notes: Named after Achilles, who supposedly first used the species to cure wounds; the specific name means divided a thousand times; a long-acclaimed medicinal species, yarrow infusions are a well-known cure for colds and flu, also known to increase body temperature and equalize circulation, open pores, regulate liver function, reduce menopausal symptoms and to speed up childbirth; as well, it acts as a laxative and stomach tonic, and poultices were applied to heal infections, stop bleeding, treat sore eyes; yarrow is recommended as an early successional reclamation species, showing good germination and vigorous rhizome growth; preliminary development efforts also indicate that the seed can be handled easily with conventional machinery.

AGOSERIS Raf. - False Dandelion

Common Characteristics

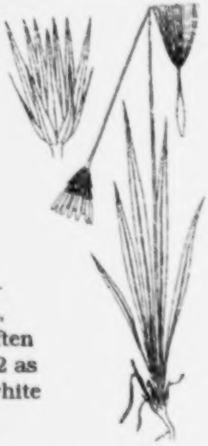
- Scapose perennials with taproots; juice milky.
- Leaves in a basal tuft, entire to pinnately divided, elongate.
- Scapes long, with a solitary flower head.
- Involucre bracts mostly overlapping, in several series, outermost short and broad.
- Flowers yellow-orange, all perfect and ligulate.
- Receptacle (in ours) naked.
- Achenes rounded-angled, usually with a prominent narrow beak.
- Pappus of white fine, hair-like bristles.

Key to Agoseris

1. Flowers yellow (or drying pink); achene beaks thick, to 1/2 the length of the body, nerved; widespread. *A. glauca*

Flowers orange (drying pink-purplish); achene beaks slender, more than 1/2 the body length, nerves obscure or absent; Rocky Mountain species. *A. aurantiaca*

Agoseris glauca (Pursh) Raf. var. ***glauca*** - False Dandelion

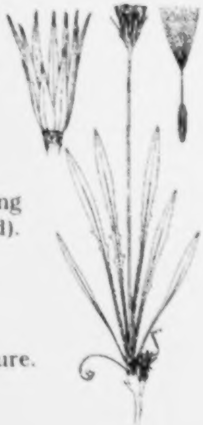


Growth Habit: Taprooted perennials; scapes 1.5-5 dm. tall, hairless to sparsely hairy, **densely hairy just below head, often glaucous**; plants with **milky juice**.

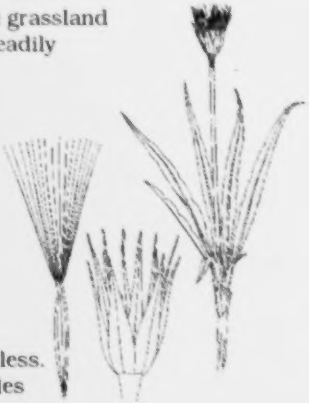
Blades: Leaves **all basal, linear-oblanceolate, remotely toothed, less often slashed-pinnately divided**, sparsely hairy to hairless, **often glaucous, 1-2 dm. long**.

Inflorescence: Bracts **subequal to overlapping**, pointed to long-pointed, **often purple-spotted; heads all ligulate, solitary, on long naked stems**, flowers **yellow (often drying pink)**; achenes with the beak stout, **to 1/2 as long as body**, the **10 nerves prominent, with a white fluffy pappus**.

Similar Species:



1. ***Agoseris aurantiaca*** (Hook.) Greene - Orange False Dandelion
   Found in the Rocky Mountain region where confined to montane and subalpine areas. Found in open woods, in grassy meadows.
   Differs as follows:
   - Blades often narrower, from linear-oblong to linear (also entire to pinnately divided).
   - Foliage not glaucous.
   - Flowers orange in life, becoming pink-purplish when dry.
   - Beak of achene slender, more than 1/2 as long as the body, the nerves obscure.



2. ***Nothocalais cuspidata*** (Pursh) Greene - Prairie False Dandelion
   Rare locally, found in open prairie grassland in the south. Difficult to identify readily unless observed previously.
   Distinguished by the following:
   - Leaves linear, the margins often crisped, 7-30 cm. long, with a long tapering point.
   - Leaf margins conspicuously hair-fringed.
   - Flower stalks about as long as leaves.
   - Flowers yellow, bracts nearly equal.
   - Achenes 8-10 mm. long, beakless.
   - Pappus of long capillary bristles mixed with long-pointed scales.

Habitat & Distribution: Common in most regions, less frequent in the boreal forest. Grows in a variety of habitats: in fescue grassland, in clearings and meadows, in prairie grassland (especially in sandy soil), on montane and subalpine meadows and slopes where tending to occupy submesic-subxeric sites.

Forage Value: Fair, palatability high for sheep, considerably lower for other livestock and game; plants remain fairly attractive until late season if they are kept grazed off and moisture supply is adequate.

Grazing Response: An increaser; an abundance of false dandelion in rangeland is an indication of heavy use in the past, although populations can decline with continued heavy utilization by sheep.

Notes: From the Greek *aix*, goat, *seris*, chicory, the reference unclear, *glauca*, because of the pale blue-green color of the foliage; false dandelion is an excellent early successional reclamation species, germination is good, and it is adapted to wide range of soil textures and moisture regimes; although essentially taprooted, plants often become pseudo-rhizomatous in disturbed and coarse soil, which increases soil binding capacity; as with many composites, however, the fluffy seed will remain the primary deterrent to development of the species on a commercial scale.

ANTENNARIA Gaertn. - Pussy-toes; Everlasting

Common Characteristics

- Perennial herbs with fibrous roots and branching caudices, sometimes rhizomatous or stoloniferous.
- Hairs woolly, often dense.
- Leaves basal (often in a conspicuous rosette) and cauline, alternate, these either well developed or much smaller.
- Male and female flowers mostly on separate plants, the heads few to several, small, discoid.
- Bracts overlapping, white to dark-tinged (or pink), with pale tips.
- Flowers dissimilar: staminate with a tubular corolla, unbranched style, few pappus bristles; pistillate with a narrower corolla, 2-branched style, and pappus of numerous fine, hair-like bristles.
- Achenes rounded or slightly compressed.

Key to Antennaria

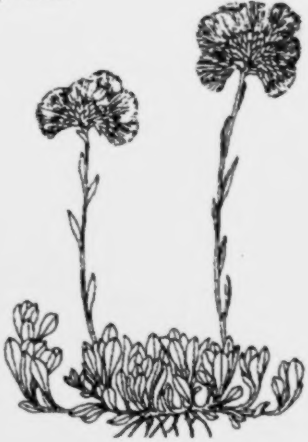
1. Plants with evident rosettes of leaves at the base, these mostly ovate-spatulate; stem leaves few and much reduced. 2

Plants with basal leaves (when present) ascending, rosettes absent; stem leaves well developed. 7

2.	Leaves glabrous above; heads in open racemes on elongate stalks; bracts mostly glabrous; Rocky Mountain species.	*A. racemosa*
	Leaves mostly hairy, heads more compact, in corymbs; bracts hairy at base.	3
3.	Basal leaves 5 mm. wide or more, mostly green and glabrous above; stolons often leafless, ending in rosettes; leaves with a scarious, awn-like tip.	*A. neglecta*
	Leaves mostly 5 mm. wide or less, often grey-hairy above and below; stolons leafy; leaf tips not conspicuously scarious-awned.	4
4.	Bracts pinkish.	*A. rosea*
	Bracts white to tawny-brownish.	5
5.	Bracts brownish throughout, the tips rounded; of higher elevations.	*A. umbrinella*
	Bracts white or nearly so; distribution variable.	6
6.	Stems 10-25 cm. tall, with 8-12 leaves; involucres 4-7 mm. high.	*A. parvifolia*
	Stems to 15 cm. tall, with 5-7 leaves; involucres 7-12 mm. high.	*A. aprica*
7.	Bracts white, usually with a small brown spot at the base; upland species.	*A. anaphaloides*
	Bracts brownish, sometimes white at the tip; species of moist places.	*A. pulcherrima*

Antennaria aprica Greene - Low Everlasting

Growth Habit:	**Stoloniferous** perennials, **mat-forming**; stems **relatively stout but short, less than 15 cm. tall.**
Blades:	Basal leaves **usually numerous, in a rosette, 1-3 cm. long, spatula-shaped-oblanceolate, less than 1 cm. broad** (usually 5-8 mm.); cauline leaves **much smaller, 5-7**; leaves **with blunt tips**, lacking pale-short-pointed tips; leaves **grey-green, hairy on both surfaces**.
Inflorescence:	Heads **several**, the pistillate with **involucres 7-12 mm. high**; bracts **white or rarely pink-tinged, the tips blunt, rarely acutish**.



Similar Species:

1. ***Antennaria parvifolia*** Nutt. - Small-leaved Everlasting
Common, similarly distributed, but more frequent in the boreal forest. Found in similar habitats as *Antennaria aprica*. Previously known as *A. nitida*.
Differs as follows:
   - Stems taller (15-25 cm.).
   - Leaves smaller (1-2 cm. long).
   - Stem leaves more numerous (8-12 per stem).
   - Foliage often more grey-white hairy.
   - Pistillate involucres small (4-7 mm. high).
   - Bracts often pointed, white, sometimes pink in *A. rosea* (considered a subspecies by some authors).

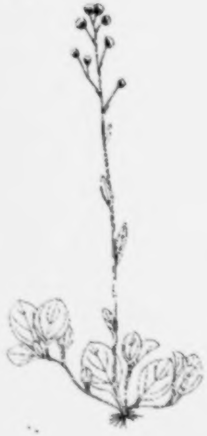
2. ***Antennaria neglecta*** Greene - Common Pussy-toes
Found throughout most regions, uncommon in the prairies. Grows in open woods and thickets, in shrubby places, moist grassland.
Distinguishing features:
   - Stolons often leafless, with a terminal rosette.
   - Basal blades relatively large (2-3 cm. long, to 1.5 cm. wide), oblanceolate-spatula-shaped, often 3-nerved.
   - Stem leaves few, small, their tips pale (withering when dry).
   - Leaves mostly green and hairless above.
   - Pistillate bracts long-pointed.

3. ***Antennaria umbrinella*** Rydb. - Pussy-toes
One of several species found at higher elevations in the Rocky Mountains, but also occurring in foothills/montane areas, in the Cypress Hills. Grows on dry, often rocky slopes.
Differs as follows:
   - Leaves tending to be more pointed at tips.
   - Bracts brownish or green-brown at base, tawny-brownish at apex.
   - Bracts mostly obtuse at tips.

4. ***Antennaria racemosa*** Hook. - Everlasting

A species of the Rocky Mountains, found in montane to subalpine wooded areas. Distinguished as follows:

- Perennials 1-5 dm. tall, with stolons; stems glandular above.
- Leaves mostly basal, oval-obovate, 1.5-6 cm. long, on short stalks, woolly below, green and mostly glabrous above, rather thin.
- Racemes open, with slender pedicels.
- Bracts mostly glabrous.
- Involucres to 5 mm. high in staminate heads, to 8 mm. in pistillate.



Habitat & Distribution: A few occurrences in the boreal forest, common elsewhere. Found in prairie grassland, on open dry slopes.

Forage Value: Poor, low-growing everlasting species seldom forming a significant amount of forage and this is usually below grazing level; antennarias are somewhat palatable to sheep, otherwise usually avoided by grazing animals; taller growing species tend to be utilized to a greater extent, but this is more likely because foliage is more accessible than because of higher palatability.

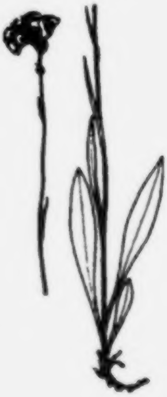
Grazing Response: An increaser and indicator of overgrazing; low growth habit and vegetative reproduction of the mat-forming species make them very resistant to heavy trampling.

Notes: Syn. *A. parvifolia*; the Latin name *Antennaria* is derived from the supposed resemblance of the pappus of staminate flowers to insect antennae; *aprica* appropriately means sun-loving; also known as pussy-toes, catspaw; taller growing species can be attractive ornamentals, as can be lower growing plants with pink or dark-colored (in the case of many alpine species) heads; *Antennaria* functions to some extent to provide ground cover in depleted pastures and may prevent invasion of non-native weeds that, once established, are much more difficult to eradicate.

Antennaria pulcherrima (Hook.) Greene - Showy Everlasting

Growth Habit: **Tall perennials** from short rhizomes, often branched at the base; stems often several, **2-5 dm. tall, silky-woolly**.

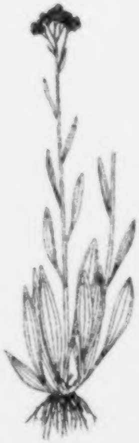
Blades: Basal blades narrowly oblanceolate to lanceolate, **5-15 cm. long**, often tufted, **erect, not mat-forming**; cauline blades linear-lanceolate, reduced upward; **leaves loosely white-grey woolly on both surfaces, the lower prominently 3-nerved.**



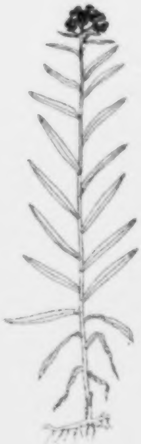
Inflorescence: Heads several to numerous in a compact inflorescence; **bracts greenish or pale brownish-black, the tips somewhat paler, the base commonly with a small dark spot; bracts 7-9 mm. high, woolly pubescent at the base**, the tips usually obtuse, or the inner acutish.

Similar Species:

1. ***Antennaria anaphaloides*** Rydb. - Tall Everlasting
   Restricted to southern regions. Also in Cypress Hills. Found in open woods and meadows, foothills grasslands and into montane areas.
   Differs as follows:
   - Bracts mostly white, with a small black spot at the base.
   - Involucre generally smaller, 5-7 mm. high.



2. ***Anaphalis margaritacea*** (L.) Benth. & Hook. - Pearly Everlasting
   Common in the foothills and Rocky Mountain region, also in Cypress Hills. Found in open woods.
   Distinguished as follows:
   - Rhizomatous plants 2-6 dm. tall, stems white-woolly.
   - Basal leaves often withered by flowering time.
   - Cauline blades numerous, 3-10 cm. long, linear-lanceolate, the margins rolled.
   - Leaves green above, white-woolly below.
   - Heads mostly dioecious, the pistillate sometimes with a few staminate flowers.
   - Heads in a broad, short inflorescence.
   - Bracts imbricate, scarious, white, sometimes with a small dark spot.



Habitat & Distribution: Common in the Rocky Mountain region, with a few scattered populations in central regions and in the northern boreal forest. Found in moist grasslands and meadows, in moist open woods, on river flats, from low to moderate elevations.

Forage Value: Poor; although larger members of the genus are more productive than mat-forming species, palatability is inferior to that of most associated species; plants will be used to some extent by sheep, also in emergency situations.

Grazing Response: Increasers, the taller growing everlastings not stoloniferous, and not as aggressive in response to heavy grazing as the low growing species.

Notes: Larger everlastings belong to a group of well-known cultivated ornamentals, prized because of their variously colored, non-withering flower heads; *Anaphalis* flowers, in particular, are known to persist and are often dried for use in floral arrangements; of the three mentioned species, *Anaphalis* the most responsive on disturbances, often a natural pioneer along montane roads and trails, and can be successfully transplanted into wild gardens.

ARCTIUM L. - Burdock

Common Characteristics

- Large taprooted biennial herbs.
- Blades petioled, ovate-oblong, often cordate, entire to somewhat toothed.
- Blades large (to 5 dm. long).
- Heads several-many, discoid, mostly globose.
- Involucre bracts in several series, narrow, often with a stiff hooked tip.
- Receptacle flat, bristly.
- Flowers all tubular, perfect, pink to purplish.
- Pappus present as many short bristles, deciduous.
- Achenes oblong, 3-5 angled, often dark-mottled, glabrous.

Arctium minus (Hill) Berhn. - Common Burdock

Growth Habit: Coarse, branching biennial; **stems 8-12 dm. tall, finely rough-hairy**.

Blades: **Leaves ovate-oblong, often cordate, petioled, to 5 dm. long**, usually shallowly toothed; blades firm, green and mostly glabrous above, **paler and often tomentose below.**

Inflorescence: Heads several-many, **discoid**, nearly globose, **1.5-3 cm. thick**; bracts in several series, **glabrous**, narrow, **the inner spine-tipped, the**

outer with hooked tips; receptacle flat, **bristly; flowers all tubular, not glandular, pink-purplish; pappus present as short bristles**; achenes 5-6 mm. long, glabrous and often dark-mottled, nerved.

Habitat & Distribution: Introduced, becoming common in waste and disturbed places.

Forage Value: Poor, the foliage stiff and unattractive at all stages of growth.

Grazing Response: An invader, primarily a weed of disturbed and waste places, rarely invasive on rangeland except in severely overgrazed pastures, most frequently confined to fence lines, around dugouts; burdock is probably most troublesome in forage crops where the normal life span of the crop is compatible with the biennial nature of burdock, allowing it to become well established and produce an abundance of seed.

Notes: From the Greek *arktos*, bear, a possible reference to the hooked bracts; the genus is a familiar one in terms of human use, the cooked foliage edible, and roots can be boiled and eaten or roasted and ground as a coffee substitute; various root decoctions are known for their cleansing effects, used as a laxative, for gout, rheumatism, and as an antidote for mushroom poisoning; leaf poultices can be applied to sores, wounds and sunburn; the seeds have diuretic properties, but have also been known to cause miscarriage. *Note*: *Xanthium strumarium* L., Cocklebur, has similar leaves, but these often more deeply wavy-toothed, very rough; heads unisexual, the pistillate bur-like/bristly at maturity, 2-beaked; grows in moist areas, prairies.

ARNICA L. - Arnica

Common Characteristics

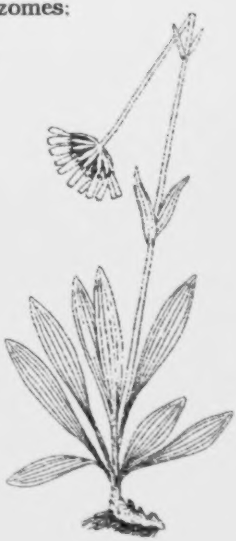
- Perennials with fibrous roots from a rhizome or sometimes branched caudex.
- Leaves simple, opposite or rarely with uppermost alternate.
- Heads mostly rather large and showy, few (solitary) to several, turbinate to hemispherical.
- Flowers radiate (rays lacking one species), yellow-orange.
- Bracts herbaceous, in 2-rows, mostly of equal length.
- Receptacle without scales.
- Achenes slender-cylindric, 5-10 nerved.
- Pappus fine, hair-like, feathery or of small stiff hairs, white to tawny.

Key to Arnica

1.	Cauline leaves well developed, 5-10 pairs; pappus brownish.	*A. chamissonis*
	Cauline leaves less than 5 pairs; pappus variously colored.	2
2.	Lowest leaves mostly long stalked, broad, ovate to cordate; woodland species.	3
	Lowest leaves usually short stalked or stalkless, narrower-linear to oblanceolate or lanceolate; species of open places.	4
3.	Lowest leaves not cordate; middle stem leaves largest, clasping; base of involucre sparsely hairy; achenes glabrous or sometimes hairy above.	*A. latifolia*
	Lowest leaves cordate; middle stem leaves not the largest; base of involucre densely hairy; achenes hairy and often glandular.	*A. cordifolia*
4.	Leaves mostly distinctly toothed; heads 1-5 (usually 3).	*A. lonchophylla*
	Leaves usually entire, heads commonly solitary.	5
5.	Base of stem without tufts of brown hair; leaves less than 10 mm. wide; disc corollas with stalked glands.	*A. sororia*
	Base of stem with tufts of brown hair; leaves about 10 mm. wide; disc corollas with both glandular and glandless hairs.	*A. fulgens*

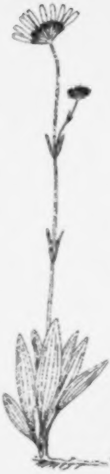
Arnica fulgens Pursh. - Shining Arnica

Growth Habit:	Perennials from **short scaly freely rooting rhizomes**; stems **2-6 dm. tall**, stout, rough-hairy and glandular, more densely so above, **plant base with conspicuous tufts of brownish hair**.
Blades:	Basal leaves stalked, **oblanceolate-narrowly oval**, 3-5 nerved, **entire or nearly so, often more than 1 cm. wide**, 3-12 cm. long; cauline blades **2-4 pairs, smaller and stalkless**; leaves rough hairy and also glandular.
Inflorescence:	Heads **usually solitary** (sometimes 3), **broad**; involucre 1-1.5 cm. high, glandular-hairy, the bracts lance-oval and blunt-acutish, **hairy within the tip**; rays **bright yellow, relatively large: 1.5-2.5 cm. long and up to 1 cm. broad**, the **tips conspicuously toothed**; disc **with both glandular and glandless hairs**; achenes slender, densely hairy; pappus of small stiff hairs, **off-white/pale tawny**.

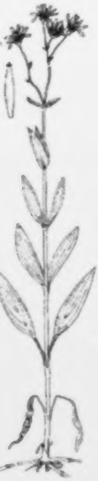


Similar Species:

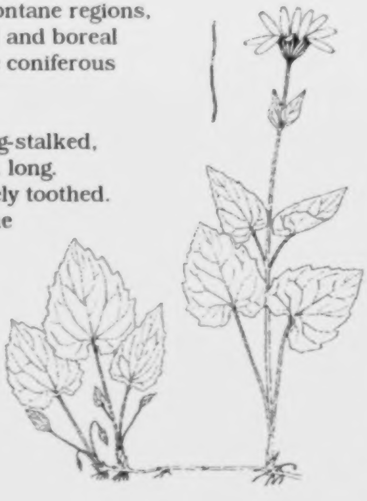
1. ***Arnica sororia*** Greene - Twin Arnica
   Also a grassland species but restricted to southern regions, and more adapted to subxeric sites.
   Differs as follows:
   - Rhizomes more elongate and slender.
   - Plants lacking basal tufts of brown hairs.
   - Leaves mostly narrower, less than 1 cm. wide.
   - Disc corollas without glandless hairs, having only stalked glands.
   - Pappus white (off-white).



2. ***Arnica chamissonis*** Less. - Leafy Arnica
   Frequent in all regions except the prairies. Grows in moist woods, depressional grassland, on shores.
   Distinguished as follows:
   - Stems 2-8 dm. tall, glandular-hairy.
   - Stem leaves well developed, large, 5-10 pairs.
   - Leaves oblanceolate/lanceolate, entire or remotely toothed.
   - Leaves hairy, longer hairs below.
   - Heads several, the involucres 8-12 mm. high.
   - Bracts blunt to pointed, the tips purplish and densely hairy inside.
   - Rays pale yellow, 1.5-2 cm. long.
   - Pappus tawny.



3. ***Arnica cordifolia*** Hook. -
   Heart-leaved Arnica
   Common in foothills and montane regions, also present in the parkland and boreal forest. An indicator of mesic coniferous forests in western regions.
   Distinguished as follows:
   - Basal leaves largest, long-stalked, cordate-based, 4-10 cm. long.
   - Leaves entire to obscurely toothed.
   - Leaves with at least some glandular hairs.
   - Heads 1-3, fairly large (involucres to 1.5 cm. high).
   - Involucres glandular-hairy.
   - Achenes hairy, pappus white.

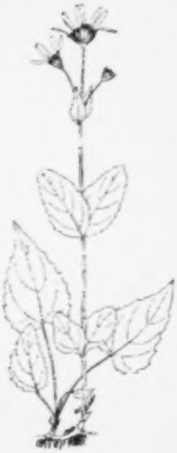


4. ***Arnica latifolia*** Bong. - Mountain Arnica

Confined to montane forests in western regions.

Differs from *A. cordifolia*:

- Foliage sometimes nearly hairless.
- Basal leaves rounded at base, occasionally somewhat heart-shaped.
- Middle cauline leaves largest.
- Involucre only sparsely glandular-hairy at base.
- Achenes often hairless, or hairless at base and sparsely hairy above.



Habitat & Distribution: Frequent in prairie, parkland, foothills and montane regions. Found in open grassland and open slopes and meadows, from prairies into montane elevations. Often restricted to depressional grassland and other slightly moist sites in driest regions.

Forage Value: Poor, although palatability varies from one region to the next, depending on availability and abundance of other species; sheep, in particular, often make fair use of arnicas, flower heads most readily consumed.

Grazing Response: Increasers, but not invasive under normal conditions.

Notes: Named by Linnaeus, possibly a corruption of another plant name *Ptarmica*; the name apparently comes from the Greek *arnakis*, a lamb's skin, alluding to the woolly foliage of some species; arnica is well known for its rather remarkable abilities to ease the pain of sprains, breaks and bruises; it is recommended only for external use, as it is toxic if ingested or if it enters the bloodstream through a wound; most arnicas have superior ornamental value and a wide range of adaptations, some, such as *A. fulgens* and *sororia* well suited to grasslands, others like *A. cordifolia* both shade and acid tolerant; as well, their rhizomatous growth habit makes them useful for site stabilization in reclamation work.

Arnica lonchophylla Green ssp. *lonchophylla* - Spear-leaved Arnica

Growth Habit:	Perennials from dark, scaly branching rhizomes; stems usually solitary, **2-4 dm. tall, stipitate-glandular-hairy** and often with longer spreading hairs.
Blades:	**Basal blades largest, 5-15 cm. long, wing-petioled, elliptic-lanceolate, dentate-serrate**; cauline blades mostly sessile, **in 2-3 pairs, narrower and reduced upward**; blades scabrous/glandular-hairy (more densely so above) to subglabrous.
Inflorescence:	**Heads** 1-9 (**commonly 3-5**), **narrow turbinate-bell-shaped; bracts 8-12 mm. high**, glandular and with longer multicellular hairs; **ligules yellow**, 1-2 cm. long; achenes pubescent; pappus white, barbellate.
Habitat & Distribution:	Rather common in the foothills/Rocky Mountain region and in parts of the northern boreal forest, found from lowland to montane elevations. Grows in moist meadows, on shores, on dry, open montane slopes.
Forage Value:	Poor, this rating given to the genus as a whole; this and other species that grow at higher altitudes sometimes occur on sheep and goat range and in these cases will be of some grazing value.
Grazing Response:	Increasers.
Notes:	Similar to other arnicas, *A. lonchophylla* is toxic when taken internally, but is known for its ability to reduce the painful symptoms of sprains and bruises when applied externally; a very attractive species, valued as an ornamental and for its soil binding properties. *Note*: *A. angustifolia* M. Valh. ssp. *tomentosa* (Macoun) Douglas D. is the most common of our cordilleran species, found from montane to alpine sites throughout the Rocky Mountains; plants are small (1-3 dm.), villose-glandular, leaves oblanceolate-lanceolate, mostly entire, 1-3 pairs cauline; bracts are purplish, heads mostly solitary.

ARTEMISIA L. - Wormwood; Sagebrush

Common Characteristics

- Perennial herbs or shrubs, roots various.
- Foliage characteristically aromatic in most species.
- Leaves alternate, entire to dissected.
- Flowers small, all tubular.
- Involucre of dry, pale (at least partially) overlapping bracts; receptacle long hairy in some species.
- Achenes mostly hairless, pappus obsolete.

Key to Artemisia

1. Leaves densely white woolly above and below, elliptic-lanceolate, usually toothed, but shallowly so. .... *A. ludoviciana*

Leaves dissected into narrow segments. 2

2. Leaf divisions feathery, very narrow, about 1 mm. wide. 3

Leaf divisions 2-3 mm. wide. 4

3. Entire plant white-tomentose; hairs present on receptacle between disc florets. *A. frigida*

Plants grey-green, variously hairy, the involucres glabrous; hairs on receptacle lacking. *A. campestris*

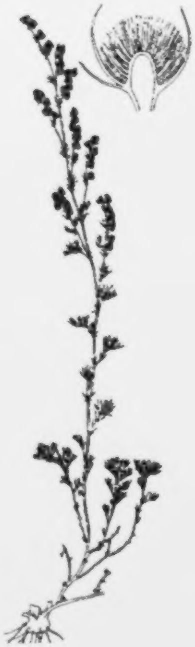
4. Plants mostly glabrous; leaf margins toothed. *A. biennis*

Plants at least partially grey-hairy; leaf margins entire. 5

5. Leaves mostly glabrous above, the lobes acute; involucre bracts to 3 mm. long, mostly glabrous, heads 3-5 mm. across; native, western species. *A. michauxiana*

Leaves grey-hairy above and below, the lobes obtuse; involucre bracts to 2 mm. long, mostly hairy, heads 2-3 mm. across; introduced, weedy. *A. absinthium*

Artemisia frigida Willd. - Pasture or Fringed Sage



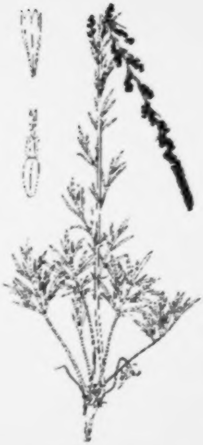
Growth Habit: Perennials **from stout, woody crowns**; plants **often forming large mats** as perennial **stems spread and root**; aerial stems **annual, 1-4 dm. tall, white-tawny hairy; strongly aromatic.**

Blades: Leaves **"feathery" dissected**, usually 2-3 times pinnate into linear-very slender segments; leaves 3-8 cm. long (including stalks), **often numerous in basal mats**; upper leaves similar, stalkless, smaller; blades densely **short grey-hairy on both sides**; leaves often with divided stipule-like structures at base.

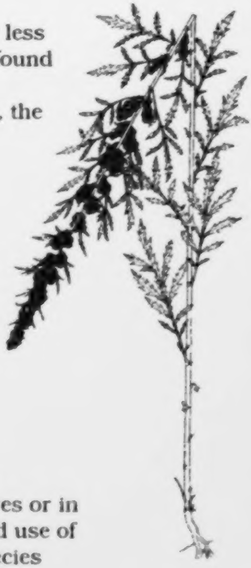
Inflorescence: Heads numerous in rather narrow panicles, yellowish; involucres **2-3.5 mm. high, densely hairy, the receptacle densely long-hairy**; flowers all tubular, fertile, the marginal ones pistillate; achenes hairless.

Similar Species:

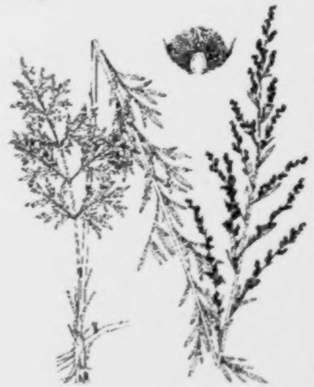
1. ***Artemisia campestris*** L. ssp. ***caudata*** (Michx.) H. & C. - Plains Wormwood
   Frequent throughout most regions. Found in sandy grassland and woods, in dry prairie grassland, on exposed slopes.
   Differs as follows:
   - Foliage only faintly aromatic.
   - Foliage hairless to sparsely hairy.
   - Blades not as finely feathery dissected.
   - Bracts hairless to sparsely hairy.
   - Receptacle without hairs.



2. ***Artemisia biennis*** Willd. - Biennial Sagewort
   Also occurs throughout but is generally less common and usually weedy in nature, found on disturbed sites, in moist habitats. Considered both native and introduced, the specific range of the two not firmly established.
   Differs from *A. campestris*:
   - Glabrous annual or biennial plants, stems more consistently red.
   - Basal tuft of leaves not evident at flowering time.
   - Leaves twice pinnate, the ultimate divisions narrow and distinctly toothed.
   - Inflorescence more leafy.



3. ***Artemisia absinthium*** L. - Absinthe
   Introduced, most problematic in pastures or in similar conditions where cultivation and use of chemicals is restricted, allowing the species to spread unchecked.
   Distinguished as follows:
   - Perennials, sometimes woody-based, 4-10 dm. tall.
   - Foliage aromatic, silvery-pubescent.
   - Leaves 2-3 times pinnate into oblong-lanceolate segments, these not toothed.
   - Heads numerous, nodding, bracts hairy, 1-2 mm. long; receptacle with long hairs.



4. ***Artemisia michauxiana*** Bess. - Sage
A Rocky Mountain species, frequent along trails, on rocky sites from montane to subalpine elevations. Distinguished as follows:

- Woody-based, rhizomatous species, 2-4 dm. tall.
- Leaves bipinnate, the divisions linear-lanceolate, toothed.
- Leaves white-woolly below, mostly green above (cauline leaves similar, reduced).
- Heads with bracts mostly glabrous, 2-3 mm. long, without hairs in receptacle.

Habitat & Distribution: Found throughout, especially common in the south. Grows in open grassland, on dry hillsides and slopes in montane regions.

Forage Value: Poor; from a nutritional perspective, fringed sage rates very highly, protein, phosphorus and fat contents above those of most associated grasses, protein levels about equal to those of alfalfa and remain good throughout winter; however, palatability is low due to an aromatic oil content, utilization restricted to fall and winter when it is sometimes moderately grazed by sheep, rather sparingly so by cattle and game.

Grazing Response: An increaser and indicator of overgrazing; poor palatability, drought tolerance as well as the increased reproductive capacity of vegetative propagation and also the abundance of viable seed produced give the species a competitive advantage. *Note*: The taprooted species *Artemisia campestris*, is similarly rated as a range species; although also an increaser, it is much less aggressive and is somewhat more restricted in its distribution patterns; on exposed slopes naturally high cover values are often a normal occurrence and not necessarily correlated to heavy grazing.

Notes: Named for the Greek goddess Artemis, or possibly Queen Artemisia whose tomb at Halicarnassus is one of the seven wonders of the ancient world; the specific name refers to the harsh (frigid) climate of E. Siberia where the species was first named; most sage species were used extensively by aboriginal people for flavoring and the seeds pounded into meal, also burned as incense and used as a deodorizer; medicinal uses were numerous, teas used for headaches, stomach problems, to rid the body of roundworms and pinworms, to treat colds, and to relieve menstral symptoms; according to folklore, sages were placed under pillows to help restore and retain youth, also to ensure good luck; from an environmental standpoint, *A. frigida* in particular is a valuable early successional species on disturbances, tending to die back once perennials establish; *A. campestris* is of special interest for revegetation in sandy soil and on dry slopes with shallow, coarse soils, useful in cases where vegetation cover is often naturally sparse.

Artemisia ludoviciana Nutt. var. *ludoviciana* - Prairie Sage

Growth Habit: **Rhizomatous, often mat forming** perennial herbs; stems **3-7 dm. tall, white-hairy**.

Blades: Lower leaves short-stalked, **lanceolate-oval, 3-11 cm. long**; averaging about **1 cm. wide**; upper leaves **stalkless and somewhat smaller** and linear-lanceolate; blades **entire to somewhat toothed, densely white-hairy on both sides**, the upper surface sometimes grey-green.

Inflorescence: Heads brownish, many in a narrow to open panicle; involucre 3-4 mm. high, **hairy**; marginal flowers pistillate, the inner perfect.

Related Species:

1. Var. ***gnaphalodes*** (Nutt.) T. & G.
   Often forming large mats, and more restricted to depressional areas, slough margins in the prairie region. Differs as follows:
   - Plants more slender and shorter, 1.5-4 dm. tall, often spreading-reclining.
   - Leaves narrower (3-5 mm. wide) and at least some folded lengthwise.
   - Leaves wide-spreading, curving, often twisted.
   - Panicles narrow, spike-like, heads slightly smaller.

Habitat & Distribution: Occasional in the boreal forest, common elsewhere. Found in open grassland, on disturbed sites.

Forage Value: Poor; although specific nutritional analysis is unavailable, indications are that nutrients are at acceptable levels; however, the genus as a whole is only marginally palatable, and utilization is almost entirely restricted to sheep.

Grazing Response: An increaser and indicator of overgrazing, the species behaving much like *A. frigida* but not as drought tolerant.

Notes: *Artemisia ludoviciana* was used in about the same capacity as *Artemisia frigida* by native people, but is especially known as part of religious cleansing rituals of the Blackfoot Tribe, and as well, was used as a poultice on bruises and boils; also an early successional species on disturbances, prairie sage is valuable in soil stabilization but is less drought tolerant than *Artemisia frigida*, and not as well adapted to poor, often alkaline soils; as with fringed sage, the abundance of the species should preclude any need for development of seed for the commercial market, as it will naturally become a part of many early phase vegetation communities. *Note: A. dracunculus* and *A. longifolia*, also with rather sparingly divided leaves, are tall, often mistaken for woody species (but are essentially herbaceous); they have been included in Volume 2 of this text series.

ASTER L. - Aster

Common Characteristics

- Perennial herbs, with fibrous roots and often also rhizomes, rarely taprooted annuals.
- Leaves alternate, simple, often toothed.
- Flowers solitary or more often several, mostly radiate, blue, purple, pink or white.
- Involucre of 2 or more series.
- Bracts mostly overlapping, the tips usually green and bases often pale-thickened; bracts in a few species leaf-like, the outer longer than the inner.
- Receptacle naked, flat or slightly convex.
- Achenes with several nerves; pappus fine, hair-like, usually single, but occasionally with a second, short outer series.

Key to Aster

1. Involucres glandular. 2

Involucres not glandular. 3

2. Leaves firm, broad (3-5 cm.), distinctly sharp-toothed. *A. conspicuus*

Leaves narrower (1-2 cm. wide), entire or somewhat toothed. *A. modestus*

3. At least some of the outer bracts elongate and leaf-like, longer than inner bracts. 4

Outer bracts never leaf-like, elongate. 5

4. Stout plants to 5-15 dm. tall, purple stemmed; leaves oblong-lanceolate, with some distant teeth, clasping/auricled at base. *A. puniceus*

Plants without above combination of characteristics. *A. subspicatus*

5. Bracts essentially glabrous (margins sometimes hairy). 6

Bracts densely hairy. 9

6\.. Lowest leaves with definite stalks, the blades often cordate. *A. ciliolatus*

Lowest leaves linear-oblanceolate, mostly sessile. 7

7. Plants entirely glabrous, glaucous; upper leaves clasping, with auricles; upland species. *A. laevis*

Plants with some hairs, these often in vertical lines from leaf bases; species of low places. 8

8. Leaves more than 5 mm. wide; flower heads 10 or more. *A. hesperius*

Leaves 2-5 mm. broad; flower heads solitary or few. *A. borealis*

9. Bracts with bristle tips; rays white; widespread. 10

Bracts without sharp, bristle tips; rays pinkish to purple-blue; most common in foothills/Rocky Mountain region. 11

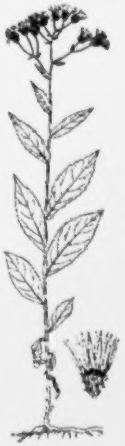
10. Roostocks short, plants tufted; heads small (involucres 2.5-4.5 mm. high), on ascending, one-sided branches; rays to 6.5 mm. long, 20 or fewer. *A. ericoides*

Rootstocks usually elongate, plants seldom tufted; heads larger (involucres 5-8 mm. high), not in one-sided clusters; rays at least 7 mm. long, more than 20 per head. *A. falcatus*

11. Heads few or solitary; basal leaves linear-lanceolate, toothed, the cauline similar. *A. sibiricus*

Heads solitary; basal leaves oblanceolate-spatulate, entire, reduced above on stems; *Erigeron*-like in appearance. *A. alpinus*

Aster conspicuus Lindl. - Showy Aster



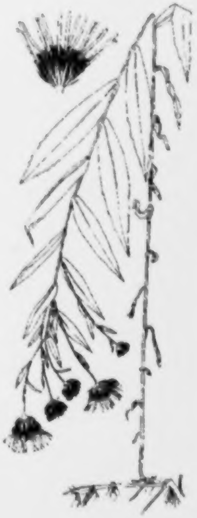
Growth Habit: Perennial from a **stout, long rhizome**; stems **3-10 dm. tall, stout, with rough white hairs, also glandular**, more densely so above; stems sometimes zig-zag-ascending.

Blades: **Lowest blades smallest**, obovate, early deciduous; **middle cauline leaves large, 6-18 cm. long**, short-stalked to stalkless, **ovate-oval, sharply toothed**; leaves **firm, thick, with roughened hairs on both surfaces**.

Inflorescence: Heads few to many in an open corymb-like inflorescence; heads **large and showy**, involucres **about 1 cm. high, densely glandular**, the tips green, long-pointed and spreading, the bases broad, pale-thickened; bracts mostly distinctly overlapping; **flowers with conspicuous blue-violet rays 10-15 mm. long**.

Similar Species:

1. ***Aster modestus*** Lindl. - Large Northern Aster
   A species of moist woods and boggy places, most common in the parkland and southern boreal forest, with disjunct populations in the southern Rocky Mountains and northern boreal region.
   Differs as follows:
   - Stems stipitate-glandular.
   - Blades thin, lanceolate, 1-2 cm. broad, sessile, entire to remotely toothed.
   - Involucres smaller, 5-8 mm. high; rays purple.
   - Bracts fleshy, glandular, loose, in 2-3 series; inner purplish.



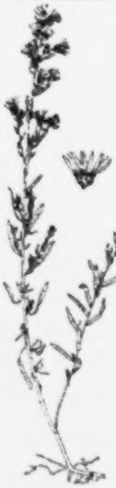
Habitat & Distribution: Frequent in most regions, absent from the prairies. Grows in woodlands (coniferous to deciduous), in clearings, in willow thickets. Showy aster reaches its peak cover values at early-mid successional levels, and persists as a common understory species in climax forests in foothills and montane ecoregions; as with all herbaceous species of mature forests, however, cover values become much reduced.

Forage Value: Fair, producing a large amount of forage and nutritional levels comparable to those of other good range species (protein content about 20% and that of phosphorus 0.5% prior to flowering); showy aster is rated as more palatable than other asters, used frequently by cattle and sheep, also rather extensively by elk during the winter and early spring.

Grazing Response: An increaser #1; *A. conspicuus* reproduces readily by rhizomes but because it is palatable and doesn't appear to be overly aggressive, tends to decline under continuous heavy grazing; it can be noted, as with other rhizomatous woodland species, that showy aster seldom produces flowers in densely shaded areas, this reducing its reproductive capacity.

Notes: *Aster* translates "a star", in reference to the showy rays; *conspicuus*, appropriately used, describes the showy flowers; native asters, showy aster not excluded, make spectacular ornamentals, also are recommended in reclamation mixes, most species relatively easy to establish and spreading readily from rhizomes; *A. conspicuus* is best suited for use in wooded regions where moisture conditions are good; it is one of our more acid tolerant species.

Aster falcatus Lindl. ssp. ***falcatus*** - Creeping White Prairie Aster



Growth Habit: Perennial herbs **from rhizomes**; stems mostly **clustered**, 1-6 dm. tall, with **rough white hairs**.

Blades: Leaves mostly cauline, **numerous**, **linear**, **entire**, **usually spiny-tipped**, **to 7 cm. long** and 5 mm. wide, **moderately-sparsely hairy with rough white hairs**.

Inflorescence: Heads **few at the ends of upper branches**, the involucres **5-8 mm.** high, the bracts **hairy, only somewhat overlapping**, the outer bracts nearly as long as the inner, mostly green, **not strongly spreading**, **spine-tipped; rays white, 7-10 mm. long, 20 or more per head**.

Related Species:

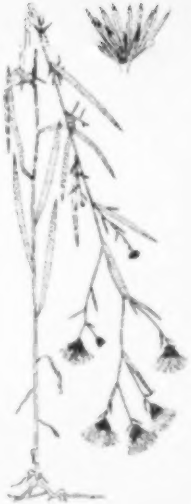
1. Ssp. ***commutatus*** *(T. & G.) A.G. Jones*
Differs as follows:
   - Plants with more elongate rhizomes, stems arising singly.
   - Plants more densely hairy.
   - Involucre bracts strongly spreading, their bases more distinctly thickened.

Similar Species:

1. ***Aster ericoides*** L. ssp. ***pansus*** (Blake) A.G. Jones - Tufted White Prairie Aster
Found in similar habitats and has more or less the same distribution. Probably more alkali tolerant, and is frequent in alkali flats.
Differs as follows:
   - Plants from a caudex and fibrous roots, sometimes developing very short rhizomes.
   - Stems clustered.
   - Hairs slightly rougher.
   - Bracts distinctly overlapping, the outer shortest; bracts spreading.
   - Heads more numerous, often on one-sided curved branches; rays less than 7 mm. long, less than 20 per head.
   - Heads generally smaller, in involucre 2.5-4.5 mm. high.

2. ***Aster hespertus*** A. Gray - Western Willow Aster
Common, found in all ecoregions. Grows in marshy places, on shores.
Distinguished as follows:
   - Strongly rhizomatous plants.
   - Stems 2-12 dm. tall, hairy in vertical lines.
   - Blades mostly cauline, stalkless, linear-lanceolate, sometimes obscurely toothed.
   - Heads several to numerous.
   - Bracts hairless except along margins.
   - Rays white (sometimes pale blue).

3. ***Aster borealis*** (T. & G.) Prov. - Aster
Frequent in all ecoregions except the prairie region. Common in bogs and marshes, and especially known as a fen species.
Differs from *A. hesperius*:
- Rhizomes more slender, usually less than 2 mm. thick.
- Leaves narrower, 2-5 mm. wide, the apex long-pointed (attenuate).
- Bracts narrower and attenuate, the green midrib narrower.
- Heads fewer, occasionally solitary.



Habitat & Distribution: Distributed throughout most regions. Found in dry, open places: in prairie grassland, on open slopes, dry banks. Soil nutrient requirements are somewhat higher than those of *A. ericoides*.

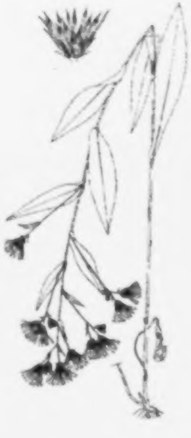
Forage Value: Poor to fair, this and the similar *A. ericoides* fairly nutritious but considerably less palatable than showy aster.

Grazing Response: Increasers.

Notes: White prairie asters are frequently found in rather sparsely vegetated areas and as such are important for soil stabilization and erosion control; *A. falcatus* is especially well suited to dry, often calcareous slopes, *A. ericoides* useful on alkali flats. *Note: A. hesperius* is rated much the same as a range species, valuable for stabilizing moist soil in depressional areas and on shores; the species requires somewhat more fertile soils, and is not alkali tolerant; *A. borealis* has a similar performance rating in bog/fen environments.

Aster laevis L. - Smooth Aster

Growth Habit: Fibrous rooted perennial from a caudex or short rhizome; stems stout, **hairless and usually glaucous, 4-10 dm. tall**.

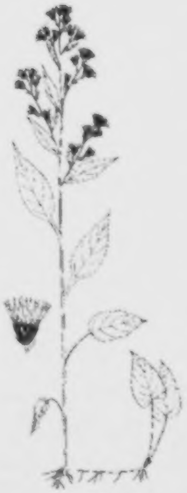


Blades: **Leaves thick, entire to toothed, hairless and glaucous, ovate to lanceolate-oblong; lowest leaves with short winged stalks**, the upper stalkless, **more or less clasping**, often with basal auricles.

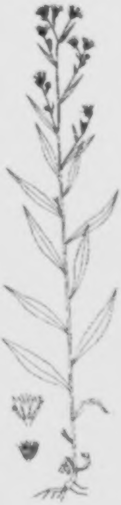
Inflorescence: Heads few-many in an open corymb-like inflorescence, this subtended by smaller leaves; involucre 5-8 mm. high, the bracts **overlapping, firm, the tips long-pointed and green**, the **bases conspicuously pale-thickened**; rays 6-9 mm. long, **blue-purple**; achenes mostly hairless, the pappus tawny.

Similar Species:

1. ***Aster ciliolatus*** Lindl. - Lindley's Aster
   Common in most regions, occasional in the prairies. Restricted to wooded areas. An indicator of rich mixedwood ecosites in many western regions.
   Differs as follows:
   - Stems hairy above, often in lines.
   - Lowest blades with long stalks, often cordate at the base, distinctly toothed.
   - Stem leaves smaller, rarely with basal appendages.
   - Blades not glaucous, with at least some hairs on veins below; thinner.
   - Bracts not distinctly white-thickened below.

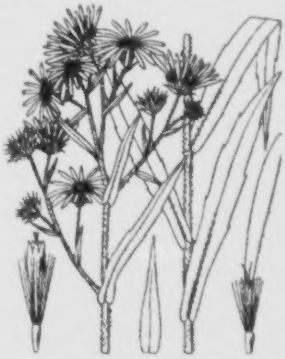


2. ***Aster subspicatus*** Nees - Aster
   Frequent in foothills/montane areas and into subalpine sites. Grows on shores, in moist woods.
   Distinguished as follows:
   - Rhizomatous plants 5-10 dm. tall.
   - Leaves glabrous to pubescent, often obscurely toothed.
   - Blades oblanceolate (lowest, these early withering) to lanceolate (cauline).
   - Upper leaves graduating into involucre bracts, the outermost bracts green and often longer than the inner.
   - Heads few, in corymbs, purplish.
   - Pubescence on stems usually in vertical lines.



Other Species:

1. ***Aster puniceus*** L. - Purple-stemmed Aster
   Rather frequent throughout boreal regions, occasional in adjacent foothills. A species of moist places, marshes.
   Distinguished as follows:
   - Stout, purple-stemmed perennials 5-15 dm. tall, stems with spreading hairs.
   - Leaves lanceolate-oblong, 5-16 cm. long, mostly sessile, entire to somewhat serrate.
   - Leaves hairy below on midribs, scabrous or glabrous above.
   - Bracts narrow, the outer with some foliaceous-elongated; bracts not strongly imbricate.
   - Flowers several, blue to pinkish.

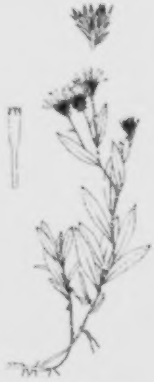


Habitat & Distribution: Distributed throughout, most common in parkland and foothills regions. Found in open fescue grassland, in open woods, clearings, in thickets. In the dry prairie region, it is restricted to areas with better soils and is found on moister sites, i.e. depressional grassland, lush coulee slopes, open woods. Tends to occupy mesic-subxeric sites in montane regions.

Grazing Response: An increaser #1, populations usually maintained in well managed pastures, but not persisting in heavily grazed and altered range.

Notes: Smooth aster is recommended for use as an early successional species; it is often a pioneer on disturbances and makes good growth providing grazing pressure is not excessive; *A. ciliolatus*, equally common in wooded regions, is similarly suitable for revegetation projects in its adapted range.

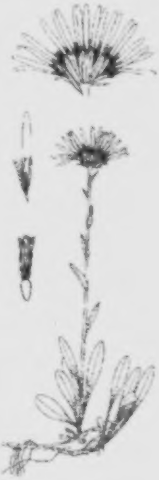
Aster sibiricus L. - Arctic Aster



Growth Habit: Perennials with rhizomes, **often somewhat mat forming**; stems 1-3 (4) dm. tall, purple-tinged, rather **evenly pubescent**.

Blades: Leaves firm, **oblanceolate to oblong**, the apex rounded and **often apiculate, entire to remotely toothed, 2-8 cm. long**; lowest leaves short-stalked, small, the **middle cauline well developed**, sessile; blades finely rough-pubescent below, **glabrous above**.

Inflorescence: **Heads few (solitary) to several**, showy, the involucre **pubescent**, 6-9 mm. high, bracts imbricate, **green** and acutish above, pale-thickened below, the **margins purple**; rays **8-12 mm. long, purple to bluish**; pappus with some shorter hairs intermixed.

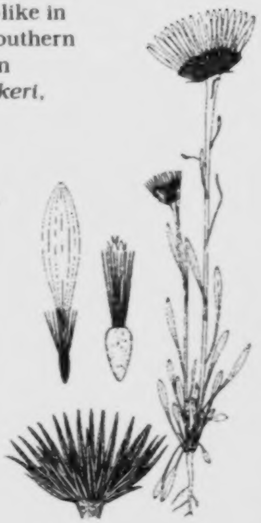


Similar Species:

1. ***Aster alpinus*** L. ssp. ***vierhapperi*** Onno. - Alpine Aster
   Confined to the foothills and southern Rocky Mountain region where found in foothills grassland, on montane to subalpine slopes. Often on mesic-subxeric sites.
   Differs as follows:
   - Blades usually entire.
   - Cauline leaves much reduced.
   - Plants (stems, blades, bracts) more grey-green pubescent and often glandular.
   - Heads solitary (*Erigeron*-like in general appearance), pale purplish to pink-white.
   - Bracts not purplish.

Other Species:

1. ***Townsendia parryi*** D.C. Eat. - Townsendia
The most attractive in the genus, aster-like in superficial appearance. Found in the southern Rocky Mountain region, in the southern prairies on dry slopes and hills. *T. hookeri*, the most common of several smaller, stemless species, can be found on exposed slopes throughout southern regions. Plants are cushion-like, leaves crowded/narrow, involucres to 15 mm. wide, and the pinkish rays to 15 mm. long.
T. parryi distinguished as follows:
   - Taprooted perennials with spatulate basal leaves, these in rosettes, hairy below, 2-6 cm. long.
   - Flowers solitary on stems 0.5-2.5 cm. tall.
   - Heads large, showy, purple-blue, rays 1-2 cm. long.
   - Bracts narrow, acuminate, scarious-fringed.
   - Pappus of elongate bristles.



Habitat & Distribution:

Most common in the foothills and Rocky Mountain region, occasional in the boreal forest. Found on shallow, often gravelly soils: on rocky slopes and hillsides, on creek banks, on river flats and terraces.

Forage Value:

Poor to fair (all mentioned species), limitations more because of low productivity than actual poor palatability; when occurring in abundance on primary wildlife range, the species can provide some quantities of herbage.

Grazing Response:

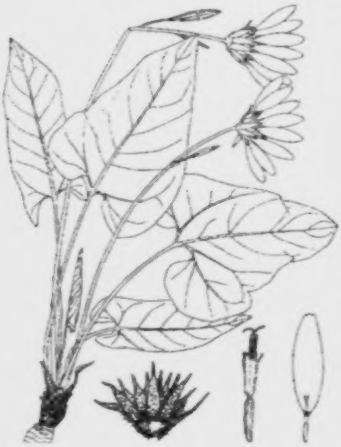
Increasers.

Notes:

Sibiricus translates of Siberia, in reference to a wide distribution in cooler, moist climates; arctic aster is a very attractive species, frequently encountered along trails and river terraces in western regions where it acts as a pioneer on disturbed coarse soils.

BALSAMORHIZA Nutt. - Balsam-root

Balsamorhiza sagittata (Pursh) Nutt. - Balsam-root



Growth Habit: Perennials **from deep-seated woody taproots; stalks stout, 2-8 dm. tall, soft-woolly-hairy**, especially above.

Blades: **Mostly basal**, these **large**, the **blades triangular-oblong to cordate, to 3 dm. long, entire, on long stout stalks**; leaves with **fine dense, soft-velvety hairs below, greener and sparsely hairy above**; cauline leaves **none or few**, much smaller and **bract-like**.

Inflorescence: Heads **radiate, mostly solitary, large**, the upper flower stalks and involucre **woolly-hairy**; bracts in **2-4 series, ovate-lanceolate**, often long-pointed; **rays yellow, showy, 2-4 cm. long**; disc flowers numerous, **pale yellow**; receptacle chaffy, its scales clasping the achenes; achenes 4-sided, hairless, 7-8 mm. long; **pappus none**.

Habitat & Distribution: Frequent in the southern foothills and montane regions. Grows on exposed hillsides, in open foothills grassland, in open montane woods.

Forage Value: Fair; balsam-root produces large quantities of forage, this fairly nutritious and moderately palatable to all classes of livestock and game; young leaves and flower heads are particularly palatable, and the species is very important in providing early season forage on some rangelands.

Grazing Response: An increaser, the long, heavy taproot storing an abundance of food supplies, and enabling plants to withstand moderately heavy trampling; however, populations can decline when closely and continuously grazed, primarily because insufficient numbers of flower heads are left to maintain stands; under normal range conditions, balsam-root produces fair quantities of seed, although these are reputed to be low in viability.

Notes: From the Greek *balsamon*, balsam and *rhiza*, root, describing the aromatic root; the specific name refers to the arrowhead-shaped leaves; also appropriately called arrowleaf balsam-root; *B. sagittata* was an important food plant for aboriginal people, the roots prepared in various ways, the leaves eaten raw or cooked, and the seeds roasted or ground into flour; medicinal uses were also numerous, the roots contain an immune-stimulating substance, and the resin known for its disinfectant properties, applied to wounds and bites; root infusions were taken internally for rheumatism and venereal diseases; various rituals involved burning the roots, the smoke reputed to cure headaches and used to fumigate rooms following disease; *B. sagittata* is valuable in providing cover and stabilizing soils, especially on slopes and hillsides where it frequently grows; plants are somewhat slow to establish, and germination is generally poor, but, unlike so many composites, the seed lacks the fluff that makes handling difficult.

BIDENS L. - Beggar-ticks

Common Characteristics

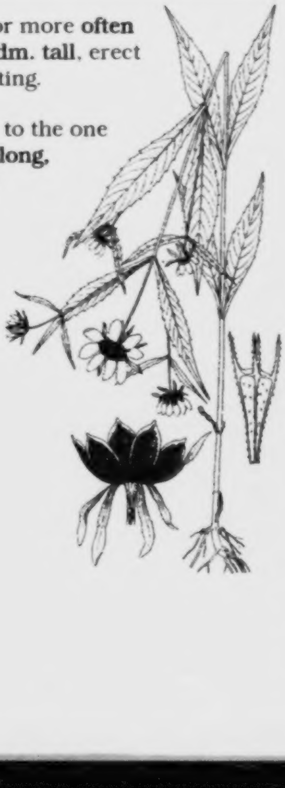
- Annuals with fibrous roots.
- Leaves opposite, simple to dissected, the ultimate divisions not linear.
- Heads radiate (yellow) or discoid.
- Bracts in two distinct, dissimilar series, the outer leaf-like, large, the inner smaller, membranous, usually grooved.
- Receptacle flat to slightly convex, chaffy.
- Rays neutral; disc flowers perfect, fertile.
- Anthers not appendaged at base; styles with flattened branches, these with short externally hairy appendages.
- Achenes flattened parallel to bracts or 4-sided.
- Pappus present, of 2-4 retrorsely barbed awns.

Bidens cernua L. - Nodding Beggar-ticks

Growth Habit: Fibrous rooted **annual; stems** glabrous or more **often with sparse spiny-scabrous hairs, 2-10 dm. tall**, erect or the base sometimes reclining and rooting.

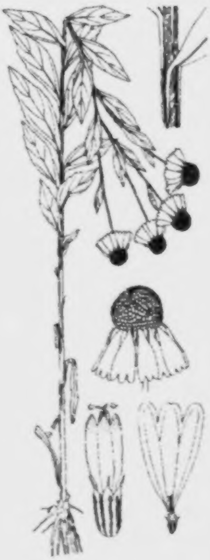
Blades: **Leaves sessile** and often connate (united to the one opposite), **linear to lanceolate, 4-20 cm. long, entire to conspicuously sharply serrate**; blades sparsely scabrous above and on margins.

Inflorescence: Heads several, hemispherical, usually nodding at maturity; **involucre with 5-8 outer leafy, unequal, spreading to reflexed bracts**, these usually longer than disc; inner **bracts yellowish, reddish-striped; rays present, yellow, rather few (6-8), to 1.5 cm. long**; disc flowers numerous; achenes 5-8 mm. long, narrowly cuneate, compressed/4-sided, the apex and marginal nerves pale-thickened; pappus of awns, mostly 4 per achene.



Similar Species:

1. ***Helenium automnale*** L. var. ***montanum*** (Nutt.) Fern. - Sneezeweed



Also a species of moist places, found on shores, wet banks, moist meadows. Most common in the southern regions. Also a few scattered populations in the northern boreal forest.

Distinguishing features:

- Stout perennials with fibrous roots, 3-10 dm. tall; glabrous to finely pubescent.
- Blades alternate, cauline, numerous, elliptical to lanceolate, short-stalked to sessile, shallowly toothed to entire.
- Leaf bases extending down stem as wings.
- Heads several-many, hemispherical to globose.
- Disc yellow, to 20 mm. broad.
- Rays yellow-orange, broadly cuneate, 3-lobed, often deflexed, 10-15 mm. long.
- Involucre not leafy-elongate, in 2-3 series.
- Receptacle naked.
- Achenes 4-5 angled, pubescent.
- Pappus brownish, of several minute awn-tipped scales.

Habitat & Distribution:

Frequent, with rather scattered occurrences throughout. Grows in wet places: on river banks, lake shores, along irrigation canals, in marshy places, often in shallow water.

Forage Value:

Poor, palatability ratings of *Bidens* not well documented but the species generally rated as inferior on good condition range; there is some evidence that members of the genus can accumulate toxic concentrations of nitrates, but few cases of poisoning have been reported; in contrast *Helenium* is toxic at all growth stages as well as after drying; sheep are most often affected because of their smaller bodily size and their greater inclination to eat forbs; our local species is not considered as dangerous as *H. hoopesii*, which occurs to the south, often much more abundant and possibly with higher levels of poison; the toxic principle has been identified as a glycoside, responsible for acute poisoning in a few cases, but more often having a cumulative effect over time; symptoms include depression, nausea, vomiting, diarrhea, bloating, excessive salivation, and death can occur from damage to internal organs or sometimes unrelated ailments to which animals succumb in their weakened condition.

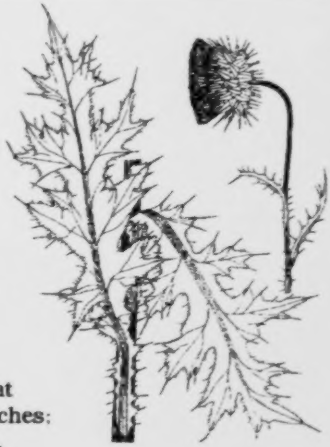
Grazing Response:

Increasers but neither species aggressive, *Bidens* opportunistic on exposed soil, which is required for the long term survival of any annual.

Notes: The generic *Bidens* refers to the 2-4 barbed awns present on the pappus; *cernua*, alluding to the nodding heads; neither *Bidens* nor *Helenium* had much value in terms of traditional human use, the latter, however, in spite of its toxicity, known as a source of snuff (hence the name sneezeweed); beggar-ticks is of special interest as a native annual, valuable in providing immediate cover on depressional disturbances while slower growing perennials establish.

CARDUUS L. - Thistle

Carduus nutans L. - Nodding Thistle



Growth Habit: **Biennial (sometimes annual)** herbs from stout taproots; stems tough and stout, **3-25 dm. tall**, grooved, hairless to hairy, especially above, **winged from leaf margins**.

Blades: Leaves to 40 cm. long and 10 cm. wide, lanceolate, **deeply lobed and spiny-toothed, hairless or long-hairy along midrib and veins below; leaf bases extending down stems as long spiny wings.**

Inflorescence: Heads **mostly solitary and nodding at the ends of long, mostly naked branches**; heads usually **large, the disc 4-8 cm. across** (sometimes small, about 1.5 cm. broad); bracts in several series, the outer 2-8 mm. broad, with long, flat, spreading spine-pointed tips; inner bracts narrower, softer, less spiny; bracts **purple-tipped, purple-suffused**; corollas all tubular, **purple**; pappus fine, hair-like, of small stiff hairs, **not feathery**; achenes about 4 mm. long, glossy, light brown with darker stripes.

Habitat & Distribution: Introduced, rather common in some regions of central Saskatchewan, and found in southern Alberta, where most populations are small and scattered. Serious infestations occur in some areas where the species has gone unchecked. Found in waste and disturbed places, along roadsides. Designated as a restricted weed in Alberta.

Forage Value: Poor, unpalatable and worthless as a range species.

Grazing Response: An invader, native to Eurasia, N. Africa and the Canary Islands; a prolific seed producer, nodding thistle is capable of spreading rapidly in disturbed areas, in tame and irrigated pastures, also a potential problem in depleted rangeland.

Notes: The generic name is the ancient Latin term for thistle. *Cirsium* species once lumped with *Carduus* as one genus; as the common name indicates, the species can readily be distinguished by its large, nodding heads.

CENTAUREA L. - Knapweed

Common Characteristics

- Annual to perennial herbs from taproots or rhizomes.
- Blades basal or alternate, entire to pinnately divided.
- Inflorescence of few to many heads.
- Heads discoid, the flowers tubular, either perfect or more often the marginal ones sterile with enlarged, irregular, false subradiate corollas.
- Involucral bracts overlapping in several series, spine-tipped or with pale jagged to comb-like terminal appendages.
- Receptacle nearly flat, densely bristly.
- Corollas blue to white or yellow, with a slender tube and long narrow lobes.
- Pappus in several series of graduated fine, hair-like bristles or scales, sometimes reduced or absent.

Key to Centaurea

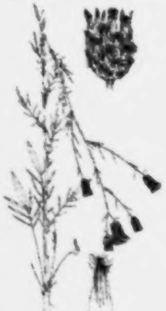
1. At least some of the involucre bracts spine-tipped; bracts without conspicuous purple markings. *C. diffusa*

Bracts without distinct spines at tips; bract color variable. 2

2. Leaves pinnately divided; bracts purple-tinged, with comb-like marginal fringes; taprooted species. *C. maculosa*

Leaves entire to pinnately lobed, not deeply divided; bracts not fringed along margins, the inner with feathery tips; plants distinctly rhizomatous. *C. repens*

Centaurea maculosa Lam. - Spotted Knapweed



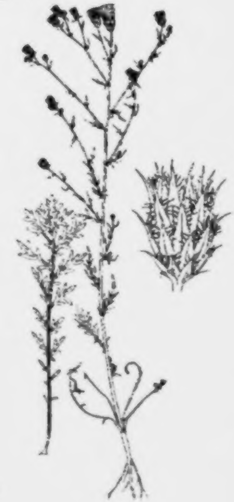
Growth Habit: **Biennial or short-lived perennial from a taproot**; stems 3-15 dm. tall, somewhat branched above, with thin, loose, early deciduous hairs over short roughened hairs.

Blades: **Basal and lower cauline leaves pinnately divided**, with narrow lobes, the uppermost smaller and often entire; leaf hairs similar to those of stems, blades also evidently **glandular-pitted**.

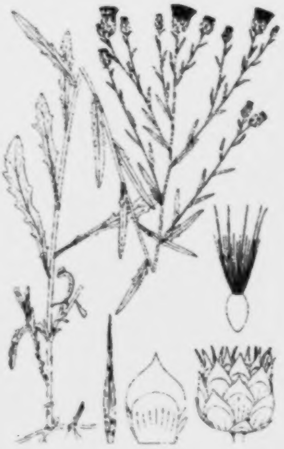
Inflorescence: Branches numerous, terminated by heads, these constricted upward in life; involucre **10-13 mm. high**, the bracts **striped, purple-margined, with a comb-like marginal fringe, without a stiff, terminal spine**; flowers **pink-purple**, occasionally paler, the **marginal ones enlarged and ray-like**; pappus fine, hair-like and to 2 mm. long, rarely absent.

Similar Species:

1. ***Centaurea diffusa*** Lam. - Diffuse Knapweed
   Occasional in Alberta, but not as common as the preceding species. Well established in British Columbia where it readily invades native rangeland.
   Differs as follows:
   - Also taprooted but plants annual to biennial.
   - Stems more spreading-branched.
   - Foliage more grey-green.
   - Leaves more finely dissected, the lower early deciduous.
   - Involucre smaller, 8-10 mm. high; flowers white-pale purplish.
   - Bracts (at least outer and middle) comb-like to spiny-hair-fringed, not evidently striped, not dark purple-tipped.
   - Bracts with a definite terminal spine 1.5-4 mm. long, marginal ones not enlarged.
   - Pappus lacking.



2. ***Centaurea repens*** L. - Russian Knapweed
   Also introduced, found in central Alberta, in B.C. and Saskatchewan, generally not common. Found in waste places, along roads, in cultivated fields.
   A persistent weed difficult to eradicate once established, and has been designated as a noxious weed.
   Differs as follows:
   - Plants perennial from deep-seated rhizomes.
   - Blades at most pinnately lobed, the upper less so to mostly entire.
   - Outer bracts round-ovate, with mostly entire, pale tips.
   - Inner bracts narrower with feathery-hairy tips.
   - Flowers pink-purple, none enlarged.
   - Pappus fine, hair-like and feathery, deciduous.



Habitat & Distribution:

Introduced, now rather widespread, common especially in northern Montana and northward into Alberta. Found in disturbed areas, along roads and trails, in rangeland. Spotted and diffuse knapweed have been designated as restricted weeds in Alberta.

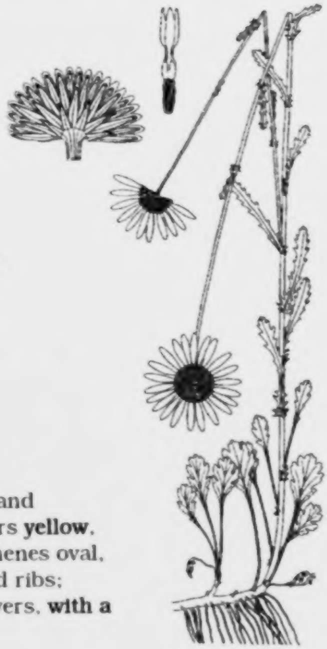
Forage Value: Poor, knapweeds unpalatable and providing no forage for grazing animals.

Grazing Response: An invader, native to E. Europe and Asia Minor; knapweeds produce an abundance of viable seed, and their aggressive nature gives them a competitive advantage in both waste places and on native rangeland; the thick, often perennial root system of *C. maculosa* is especially difficult to eradicate, mechanical control alone seldom effective; as well, the root systems of both spotted and diffuse knapweed exude chemicals that suppress the growth of other vegetation.

Notes: The generic name is derived from folklore involving the injury of a Centaur with one of Hercules' arrows; *maculosa* (as well as the common name) refers to the markings on the bracts; another member of the genus is the well-known corn-flower or bachelor's button (*C. cyanus*), sometimes an escaped species but as yet not considered troublesome.

CHRYSANTHEMUM L. - Chrysanthemum; Ox-eye Daisy

Chrysanthemum leucanthemum L. - Ox-eye Daisy



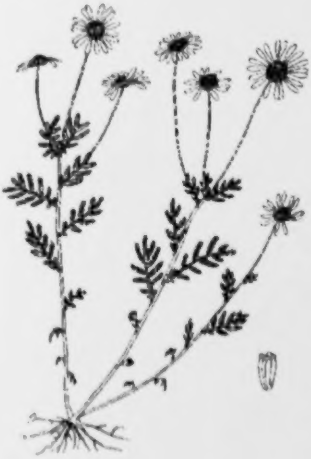
Growth Habit: Perennials **from well developed but shallow rhizomes**; stems erect, simple or forked above, 2-8 dm. tall, grooved, hairless or slightly hairy.

Blades: Basal **blades stalked, oblanceolate-spatula-shaped, 4-15 cm. long, wavy-toothed or shallowly pinnately lobed; cauline blades reduced** upward and nearly stalkless, usually toothed, often sharply lacerate toward the base; blades hairless to spasely hairy.

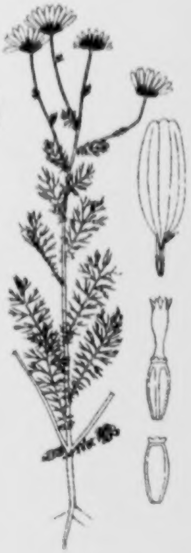
Inflorescence: Heads **solitary, on long stalks, radiate, about 4 cm. broad**; bracts overlapping, narrow, **with a brown submarginal stripe**, pale-margined and tipped; receptacle naked; disc flowers **yellow**, the rays **white, 10-15 mm. long**; achenes oval, brown-black and with 10 pale raised ribs; pappus none; plants, especially flowers, **with a strong disagreeable odor**.

Similar Species:

1. ***Anthemis tinctoria*** L. - Yellow Chamomile
Also introduced and not yet widespread, but locally abundant in the southern Rocky Mountains. An aggressive invader, capable of moving onto rangeland and into wooded areas.
Distinguishing characteristics:
   - Short-lived perennials, 3-7 dm. tall, stems white-long-hairy above.
   - Blades pinnately divided with a winged axis and deeply toothed segments, long-hairy.
   - Rays present, showy, yellow.
   - Receptacle chaffy, with lanceolate, yellow-tipped scales.
   - Pappus a short crown.



2. ***Matricaria perforata*** Merat - Scentless Chamomile
An introduced species, becoming common in the prairie region in waste and disturbed places and along highways. Designated as a noxious weed in Alberta.
Distinguishing characteristics:
   - Annual to short-lived perennial, mostly hairless, with ascending branches.
   - Plants mostly odorless.
   - Blades twice pinnate, the ultimate segments very slender.
   - Heads showy, with white rays.
   - Receptacle naked, hemispherical.
   - Pappus present as a short crown.



Habitat & Distribution:

Introduced, becoming common in the foothills and montane regions. Grows in waste places, along roads, in cultivated areas, and in both open and wooded pastures. Designated as a noxious weed in Alberta.

Forage Value:

Poor, plants highly unpalatable due their strong offensive odor, and will be avoided by livestock even when other forage is depleted.

Grazing Response: An invader; introduced from Eurasia as an ornamental; ox-eye daisy has the ability to spread very quickly, both in disturbed areas and in foothills grasslands, its success as a competitor due to poor palatability and reproductive nature, producing both an abundance of viable seed, and also rhizomes; eradication is difficult, the first year rosettes often overlooked, and by the second season of growth, it has the ability to quickly replace 50% of associated species; as well, the tendency of plants to inhabit wooded pastures makes control difficult, limiting mechanical methods, and risking damage to woody species when chemicals are applied; the similarity of the seeds to several species of grass seed increases the risk of introducing ox-eye daisy in reclamation mixes. *Note:* Yellow chamomile and scentless chamomile are also very invasive, the former only recently introduced in southern regions, but now moving rapidly into montane meadows; scentless chamomile is problematic in both the foothills and in drier regions, frequently introduced as a contaminant in seed.

Notes: From the Greek *chrysos*, gold, and *anthos*, flower, the specific name, in contrast, means white-flower; the three above-named species have all been introduced as ornamentals, and in spite of their obvious aggressiveness, are still treasured in many flower gardens.

CIRSIUM Mill. - Thistle

Common Characteristics

- Biennial or perennial herbs, from rhizomes or more commonly taproots.
- Leaves alternate, stalkless, toothed to pinnately divided, often prickly.
- Heads solitary to numerous, usually large, discoid.
- Involucre bracts in several series, mostly overlapping, usually spine-tipped.
- Receptacle densely bristly.
- Flowers tubular, with narrow tube and lobes, white or cream-colored to pink or purple.
- Achenes hairless, mostly flat, several nerved.
- Pappus of numerous feathery bristles, these united at the base into a ring.

Key to Cirsium

1. Heads less than 2.5 cm. high, involucres 1-2 cm. high; strongly rhizomatous plants. *C. arvense*

Heads more than 2.5 cm. high, involucres more than 2 cm. high; plants sometimes with short rhizomes (especially *C. flodmanii*). 2

2. Upper leaf surface roughened from small spines; stems winged from leaf bases. *C. vulgare*

Upper leaf surface without spines. 3

3. Heads more than 5 cm. high; plants sometimes stemless. *C. drummondii*

Heads less than 5 cm. high. 4

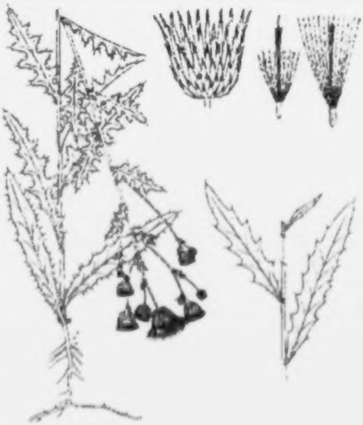
4. Outer bracts to 2 mm. broad at the base; foliage (and bracts) densely cobwebby-villose; flowers white; Rocky Mountain species. *C. hookerianum*

Plants variously hairy but not cobwebby; flowers mostly purplish. 5

5. Leaves rather shallowly lobed with triangular lobes mostly more than 7 mm. wide; involucres 2.5-3.5 cm. high; flowers pale pink-purple; southern species. *C. undulatum*

Leaves more deeply lobed into lanceolate lobes less than 7 mm.broad; involucres 2-3 cm. high; flowers deep purple; widespread species. *C. flodmanii*

Cirsium arvense (L.) Scop. - Canada Thistle; Creeping Thistle



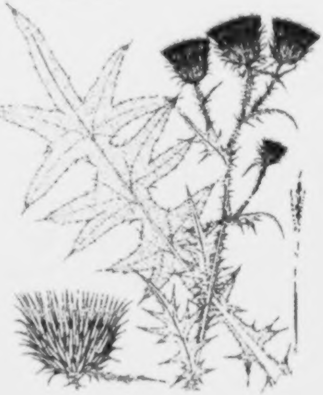
Growth Habit: Perennials **from deep-seated rhizomes**; stems hairless or nearly so, **3-10 dm. tall**, very leafy.

Blades: Leaves **green, mostly hairless or somewhat hairy below**, oblong-lanceolate, slightly clasping, **deeply and irregularly pinnately divided, the segments sharp-spiny**; blades gradually reduced above.

Inflorescence: Heads usually numerous, the plants unisexual; involucres **1-2 cm. high**, the bracts in several series, **spineless or the outer with weak spines**; bracts **often purple-margined and weakly hair-fringed**; corollas **all tubular**, **pink-purple**, sometimes nearly white; achenes tan, curved, to 4 mm. long; pappus of staminate heads short, that of pistillate longer-feathery.

Similar Species:

1. ***Cirsium vulgare*** (Savi) Ten. - Bull Thistle
   Also an introduced weed found in areas with better moisture conditions, common in waste places, along roads, in cultivated fields.
   Differs as follows:
   - Plants biennial, taprooted, often taller and more robust (6-12 dm. tall).
   - Leaves rather evenly and densely covered with small appressed spines over the upper surface.



- Heads fewer, large (involucre 2.5-4 cm. high).
- Bracts spine-tipped (but without sticky median ridge), thinly hairy.

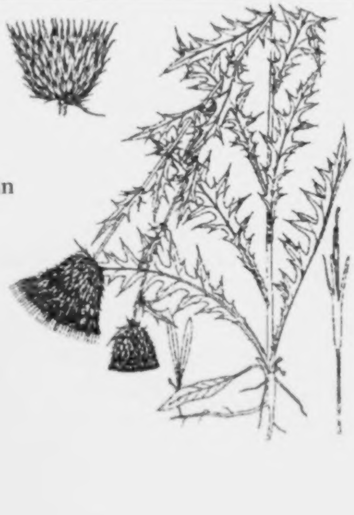
Habitat & Distribution: Introduced, common in all areas with better moisture. Found in waste places, along roads and trails, in cultivated fields, also now common in rangeland, especially where pastures have been heavily grazed. Designated as a noxious weed in Alberta.

Forage Value: Poor, the plants unpalatable and avoided by livestock at all stages of growth.

Grazing Response: An invader, native to Eurasia, and now very common in all areas with better moisture; Canada thistle is very persistent and difficult to control, the species a prolific seed producer and the deep rhizome system capable of spreading rapidly and storing large amounts nutrients; it has been documented on sites prone to excessive litter build-up (ungrazed areas, and those with high biomass agronomic perennials) that Canada thistle will root in the litter, and over time, result in rather serious infestations; attempts at mechanical control are often futile, as root fragments remain viable for an extended period of time, and may actually be spread in the process; as well, the rhizomes are often below cultivation level; a combination of late-season mowing and chemical application appears to be the most effective means of control. *Note: C. vulgare*, although not as common and not rhizomatous, increases quickly in tame and irrigated pastures, and will move onto native range where grazing is heavy.

Notes: From the Greek *kirsos*, swollen vein, for which thistles were a supposed remedy; *arvense*, means (cultivated) field, which, unfortunately, describes the species well; erroneously named "Canada" thistle, as the species is non-native.

Cirsium flodmanii (Rydb.) Arthur - Flodman's Thistle



Growth Habit: Perennial, **spreading by short-lived rhizomes**, the new plants becoming more or less taprooted; stems **3-8 dm. tall, white-woolly-hairy**, ridged.

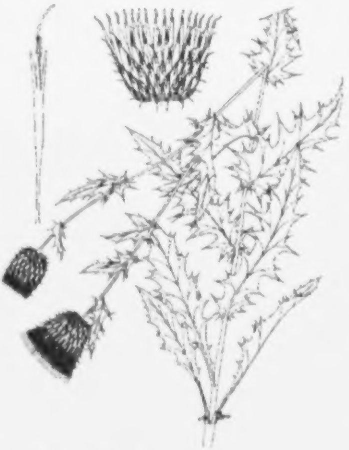
Blades: Basal rosette leaves oblanceolate in outline, often wavy-spiny-margined or only shallowly toothed; **stem leaves deeply pinnately divided and spiny-margined, the lobes narrowly lanceolate, less than 7 mm. wide**, leaves **white-hairy below, grey-green and hairy above.**

Inflorescence: Heads few (solitary) to several, the involucres **2-3 cm. high**; bracts numerous, overlapping, **the outer with a dark glutinous midrib, glandular**, the **apical prickles 2-4 mm. long, spreading**; corollas deep purple, rarely paler; achenes **3-5 mm. long, with a conspicuous apical band about 0.5 mm. wide.**

Similar Species:

1. ***Cirsium undulatum*** (Nutt.) Spreng. - Wavy-leaved Thistle

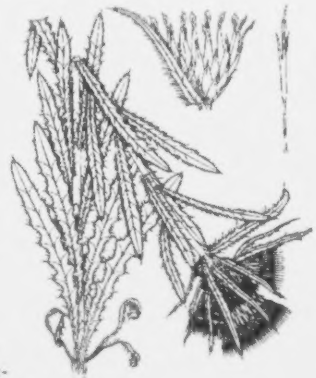
   More restricted to open dry locations, with scattered occurrences in all ecoregions except the boreal forest. More common across the south. Differs as follows:

   - Plants mostly strictly taprooted, these sometimes short-branched and pseudo-rhizomatous, producing new shoots.
   - Ultimate leaf lobes ovate-triangular, mostly 7 mm. wide or more.
   - Leaves often less deeply pinnately divided.
   - Involucres somewhat higher, (2.5-4 cm.).
   - Bracts slightly broader, paler, somewhat fewer and less closely overlapping, the prickles 3-5 mm. long.
   - Flowers paler, pink-purple, achenes larger (5-7 mm. long), the apical band obsolete to very narrow.

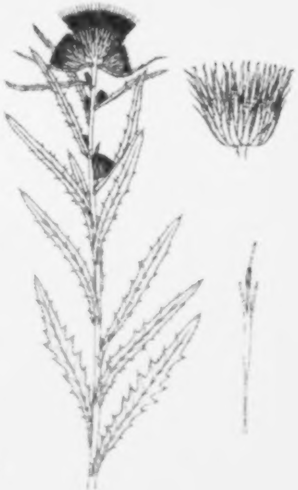
2. ***Cirsium drummondii*** T. & G. - Drummond's Thistle

   Most common in foothills and boreal forest regions, also occasional in the parkland. Grows in moist meadows, in open woods and clearings. Distinguished as follows:

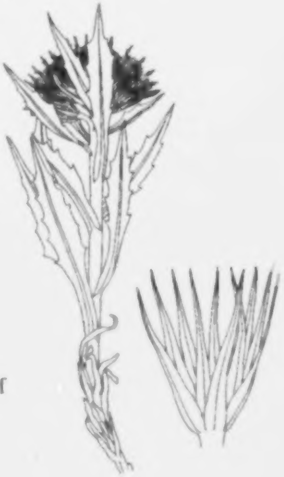
   - Biennials from taproots.
   - Stems succulent, to 10 dm. tall or short and nearly absent.
   - Stems and leaves (at least above) with cobwebby hairs.
   - Leaf lobes oblong-triangular, spiny.
   - Bracts broad-based, nearly hairless, glandular, the outer spine-tipped, the inner fringe-tipped, 5-8 mm. long; heads large, mostly 5-7 cm. high.
   - Corollas pink-purple, the heads enclosed in upper leaves, sometimes at ground level.
   - Pappus shorter than corollas.

3. ***Cirsium hookerianum*** Nutt. - White Thistle
Restricted to the southern Rocky Mountains (north to Jasper area) where found in foothills grasslands, in open montane woods and meadows.
Distinguished as follows:
   - Taprooted biennials.
   - Stems and blades (at least below) with long cobwebby hairs.
   - Heads sometimes numerous, in an elongate inflorescence.
   - Bracts conspicuously cobwebby-hairy.
   - Outer bracts narrower (to 2 mm. wide at the base).
   - Corollas creamy-white.



Other Species:

1. ***Saussurea nuda*** Ledeb. var ***densa*** (Hook.) Hult. - Saussurea
A Rocky Mountain species, found in subalpine/alpine areas in rocky, open places. Commonly encountered at higher elevations, occasionally montane.
Distinguished as follows:
   - Cobwebby-hairy plants 1-2 dm. tall.
   - Leaves lanceolate, the margins never spiny, instead wavy-toothed, often with glandular dots.
   - Flowers in terminal heads, purple, rays absent.
   - Involucres to 1 cm. high, cobwebby, the inner and outer of about equal length, bracts in 4-5 series.
   - Pappus bristles of 2 lengths, the inner elongate.
   - Receptacle naked.



Habitat & Distribution: Frequent in the south, scattered northward. Found in fescue grassland, in moister, depressional places in driest regions.

Forage Value: Poor, all unpalatable and worthless as range species.

Grazing Response: An increaser, but rarely considered troublesome in native rangeland; all native thistles rate much the same, thus can actually be appreciated for their attractive flowers which are often visited by fritillary and swallowtail butterflies.

Notes: Native thistles were important food plants to aboriginal people, the nutritious roots eaten raw, or boiled or roasted; as well, stems and immature flower buds were eaten; medicinal uses were varied, infusions used to kill worms, increase milk supply, to treat stomach problems and clear phlegm; externally, thistle was used on various skin disorders; thistle down was frequently a source of tinder, and is also a nesting material of a number of song birds; native thistles, especially those with rhizomes, are valuable in colonizing disturbances in rangeland, but unfortunately are often mistaken for weedy introduced species and eradicated.

CREPIS L. - Hawksbeard

Common Characteristics

- Taprooted perennials (or annuals) from a woody caudex; juice milky.
- Leaves all basal or with some reduced alternate cauline blades.
- Foliage sometimes glabrous.
- Inflorescence of several or solitary head(s).
- Flowers yellow, perfect, all ligulate.
- Bracts in 1(2) series, the outer reduced.
- Achenes with 10-20 ribs, mostly terete, not beaked or minutely so.
- Pappus capillary, whitish.

Key to Crepis

1. Annuals; cauline leaves with revolute margins and with basal auricles; introduced, weedy. *C. tectorum*

Perennials; leaves not revolute and without auricles; native. 2

2. Plants with glabrous stems; leaves entire to toothed. 3

Plants with hairy stems; leaves pinnately divided. 4

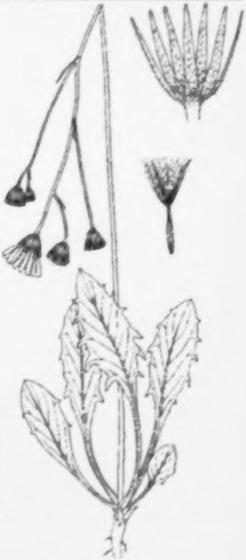
4. Low, often branched plants to 30 cm. tall; foliage glabrous and glaucous. *C. elegans*

Taller plants 20-70 cm. tall; basal leaves hairy. *C. runcinata*

5. Plants to 4 dm. tall; involucre glandular hairy, 5-10 mm. broad at its widest point. *C. occidentalis*

Plants 3-7 dm. tall; involucre not glandular but often with a few stout black hairs, to 5 mm. wide. *C. intermedia*

Crepis runcinata (James) T. & G. - Scapose Hawksbeard



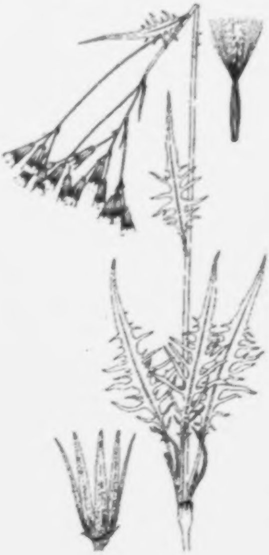
Growth Habit: **Perennials** from 1-several strong roots; stems solitary to 3, **glabrous to sparsely rough-hairy, 2-7 dm. tall.**

Blades: **Basal blades well developed, roseate, oblanceolate to elliptic-obovate, entire to toothed-pinnatifid,** with short winged petioles or sessile; **pubescence of a few scabrous, stiff hairs on both surfaces or nearly lacking; cauline leaves absent or very few, bract-like.**

Inflorescence: Heads few-several (to 20), each 20-50-flowered; involucre 9-20 mm. high, **usually somewhat hairy and often also glandular**; inner bracts 10-15; **flowers ligulate, yellow**; achenes brownish, the apex narrow to short-beaked.

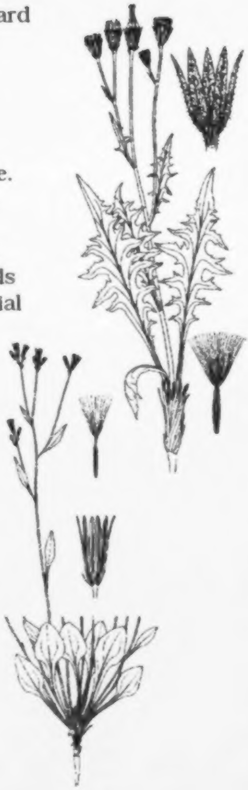
Similar Species:

1. ***Crepis intermedia*** A. Gray - Hawksbeard
   Found in western regions in dry, open places.
   Distinguished as follows:
   - Perennials 3-7 dm. tall.
   - Leaves pinnately divided, the lanceolate lobes entire or sometimes toothed, the rachis and final divisions relatively broad.
   - Blades sparsely to densely grey-woolly.
   - Heads 10-60, the involucres 10-16 mm. high and 4-5 mm. broad.
   - Involucres grey-woolly, mostly without glands, sometimes black-bristly.



2. ***Crepis occidentalis*** Nutt. - Hawksbeard
Found across southern regions on dry slopes, in prairie grassland.
Differs from *C. intermedia* as follows:
   - Plants only 1-4 dm. tall.
   - Heads fewer (12-20) and larger, 11-19 mm. high and 5-10 mm. wide.
   - Involucres with gland-tipped hairs.

3. ***Crepis elegans*** Hook. - Hawksbeard
Common in the Rocky Mountain/foothills regions. Found on rocky slopes, on fluvial sites, gravelly, sandy river banks.
Distinguished as follows:
   - Perennials 1.5-2.5 dm. tall, often bushy-branched from base.
   - Stems glabrous, glaucous.
   - Leaves spatula-shaped, to 10 cm. long, entire or shallowly toothed.
   - Heads numerous, small (involucres to 10 mm. tall).
   - Outer bracts very short, the inner longer and pale-margined.
   - Achenes golden brown, gradually narrowed to a beak 1 mm. long, with 10 roughened ribs.



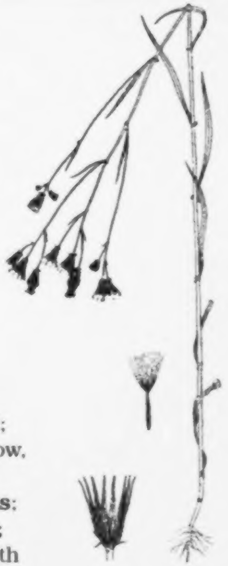
Habitat & Distribution: Frequent throughout southern regions. Found in moist, depressional meadows, moderately alkaline or saline flats, in open woods.

Forage Value: Fair, most members of the genus rated as moderately palatable for sheep and game, used less frequently by horses and cattle except early in the season when foliage is most succulent.

Grazing Response: Decreaser/increaser #1, depending on site and associated vegetation; most of our native hawksbeards are never very abundant, and utilization to any extent will seriously limit reproductive capacity.

Notes: *Crepis*, from the Greek *krepis*, a boot or sandle, possibly because the toothed leaves of some species are suggestive of sandles; *runcinata* appropriately describing the toothed blades; the common name is apparently derived from the supposed resemblance of the pappus to the bristly hairs around a hawk's beak; aesthetically, it is more often the distinctive foliage of hawksbeards and hawkweeds rather than the flowers that leaves an impression, these vegetative characteristics also sometimes more useful than floral in confirming species identification.

Crepis tectorum L. - Annual Hawksbeard



Growth Habit: **Taprooted annuals or winter annuals**; stems solitary, 1-10 dm. tall, usually branched, prominently ridged, **with stiff scabrous hairs on the ridges**, often also finely hairy.

Blades: Lower blades narrowly **lanceolate-oblanceolate, toothed to pinnatifid**, acute, to 15 cm. long, gradually narrowed to a petiole; **leaves reduced upward, sessile and with auricles**, linear, **often involute**; blades glabrous to somewhat pubescent, with **rough scabrous hairs above, on margins and on midribs below.**

Inflorescence: Heads several-numerous, each 30-20-flowered; involucre 7-9 mm. high, the outer bracts narrow, much shorter than the inner 12-15; **bracts glandular pubescent and with stiff, rough hairs**; receptacle inconspicuously ciliate; **rays yellow; achenes 3-4 mm. long**, dark purple-brown, with 10 roughened ribs, the apex narrowed but scarcely beaked.

Habitat & Distribution: Introduced, common in the parkland region, occasional southward in better moisture zones.

Forage Value: Poor, appearing considerably less palatable than our native species.

Grazing Response: An invader; although an annual and thus effectively controlled by clipping or mowing, *C. tectorum* produces an abundance of easily wind-dispersed seed, and once established, is difficult to eradicate; on grazing land, the species is most troublesome in seeded and irrigated pastures, often originally introduced as a contaminant in seed.

Notes: *Tectorum* means roofs, the implication here unclear; it is interesting to note the coincidental noxious weedy nature of two unrelated introduced annuals sharing the same specific name: *Crepis tectorum*, *Bromus tectorum* (downy brome).

ERIGERON L. - Fleabane; Wild Daisy

Common Characteristics

- Perennial (occasionally biennial) herbs, roots various.
- Leaves alternate, sometimes entirely basal.
- Heads few-several (numerous), mostly on naked flower stalks.
- Heads usually radiate, the rays white, pink, blue to purple (rarely yellow).
- Bracts in 1 or 2 series, equal to overlapping, not leaf-like, not pale based and more or less pale upward and on margins.
- Achenes usually 2-nerved, but in some species with up to 14 nerves.
- Pappus of several-numerous fine, hair-like bristles, also often with short outer scales.

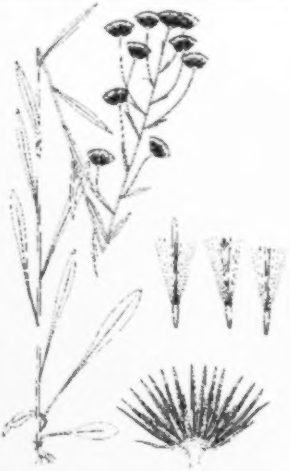
Key to Erigeron

1.	Rays yellow; mountain species.	*E. aureus*
	Rays white, pink to blue-purple.	2
2.	Leaves deeply lobed to dissected.	*E. compositus*
	Leaves entire to toothed.	3
3.	Rays inconspicuous, short (to 5 mm. long), sometimes absent.	4
	Rays conspicuous, more than 5 mm. long.	5
4.	Heads numerous (20 or more), involucres to 5 mm. high, the bracts horizontally striped, not glandular; annual.	*E. canadensis*
	Basal rosettes often evident, the cauline leaves reduced upward; involucres more than 5 mm. high, bracts not striped, glandular; biennial-perennial.	*E. acris*
5.	Basal leaves oblanceolate-spatulate, the cauline narrower but often not much reduced; leaves with long hairy margins; bracts with multicellular hairs, not glandular, bract tips purplish; of moist places.	*E. lonchophyllus*
	Plants without above combination of characteristics.	6
6.	Basal leaves usually toothed to lobed, the cauline with auricles, clasping; of moist places.	*E. philadelphicus*
	Leaves not as above.	7
7.	Leaves narrow, to 3 mm. wide, often not much reduced above; plants pubescent with long hairs; of dry places.	*E. pumilus*
	Leaves broader, usually reduced above.	8
8.	Plants with large, showy purplish rays about 2 mm. wide; leaf veins depressed, leaf margins often hairy; Rocky Mountain species.	*E. peregrinus*
	Rays narrower; leaf veins not obviously depressed.	9
9.	Stems leafy, with blades 1-2 cm. wide, these not greatly reduced above; leaves entire, ciliate, ovate-lanceolate.	*E. speciosus*
	Stem leaves less than 1 cm. wide, not ovate.	10

10. Plants grey-green with short hairs, the basal leaves 3-nerved; cauline blades sometimes not much reduced; rays white; of dry sites. *E. caespitosus*

Plants green, the basal leaves not distinctly 3-nerved; cauline blades much reduced; rays pink. *E. glabellus*

Erigeron acris L. ssp. ***politus*** (E. Fries) Schinz & Keller - Northern Daisy Fleabane



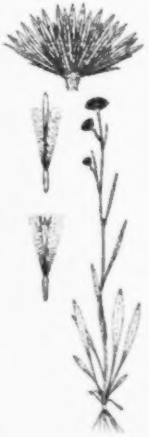
Growth Habit: **Biennial or short-lived perennial** from a taproot and simple to branched caudex; **stems 2-8 dm. tall, usually with spreading multicellular hairs, glandular above.**

Blades: Leaves both basal and cauline, **entire to remotely toothed, the basal often in rosettes, petiolate, oblanceolate-spatulate, to 10 cm. long, cauline reduced upward, narrowly lanceolate, sessile**; leaves with rough hairs or nearly glabrous.

Inflorescence: **Heads several-many, the peduncles often arched; involucre 5-12 mm. high, bracts equal, often purplish, glandular hairs multicellular, with clear cross-walls; rays numerous but short (to 4 mm. long) and narrow, pink to white**; rayless pistillate flowers also present; disc flowers perfect; achenes 2-nerved, sparsely pubescent; pappus with numerous bristles and often with a few short outer scales.

Varieties:

1. Ssp. ***debilis*** (A. Gray) Piper
   More restricted to montane to alpine habitats.
   Differs as follows:
   - Plants smaller, 0.3-1.5 dm. tall.
   - Heads mostly solitary.
   - Involucres not as densely glandular.

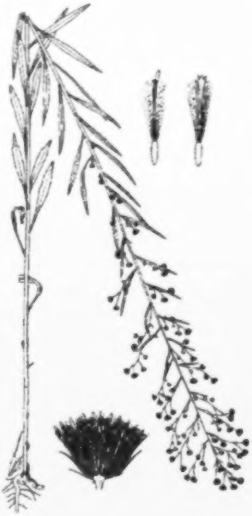


Similar Species:

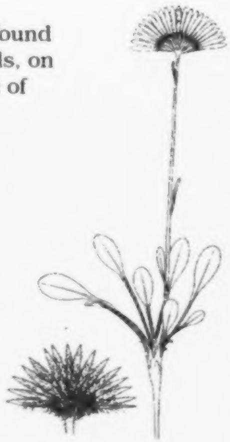
1. ***Erigeron lonchophyllus*** Hook. - Hirsute Fleabane
   Rather frequent in all ecoregions except the prairie region. Found in moist, often calcareous places: in low meadows, on shores.
   Distinguishing features:
   - Biennials or short-lived perennials, the stems 1-5 dm. tall, rough hairy.
   - Blades little reduced upward, the lowest narrowly oblanceolate/spatulate, the upper linear.
   - Blades long-rough hairy on margins.
   - Inflorescence a raceme, the flowers several (many) on erect peduncles.

- Involucre 4-9 mm. high, eglandular but with multicellular, viscid hairs.
- Bracts with purplish, pointed tips.
- Rays short, white to pink.

2. ***Erigeron canadensis*** L. - Horseweed
Widespread throughout most regions. Usually weedy in nature, found in clear-cuts, along trails, on roadsides, in disturbed fields. The similar *Aster brachyactis* Blake (rayless aster) is found throughout on shores, in moist saline sites. Leaf hairs are confined mostly to margins, rays mostly lacking; bracts green, nearly equal, lacking horizontal bars.
Distinguished as follows:
    - Annuals.
    - Heads often numerous (more than 20).
    - Involucres 4-5 mm. high, not glandular.
    - Bracts with horizontal bars.
    - Rays short, whitish.



3. ***Erigeron aureus*** Greene - Fleabane
Common in the Rocky Mountain region, found at montane to alpine elevations along trails, on rocky slopes. Often misidentified because of the yellow rays.
Distinguished as follows:
    - Perennials to 15 cm. tall, pubescent.
    - Basal blades well developed, elliptic-obovate.
    - Cauline leaves reduced and fewer.
    - Heads solitary, involucres 5-8 mm. high.
    - Hairs on involucre multicellular, often purple.
    - Involucre bracts purple-suffused, at least at tips.
    - Rays showy, yellow, to 9 mm. long.



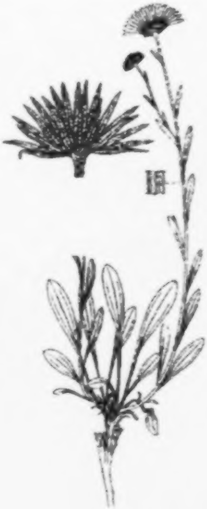
Habitat & Distribution: Frequent in the foothills/Rocky Mountain and boreal forest ecoregions. Found in moist woods, on slopes and shores, in clearings.

Forage Value: Poor to fair, all mentioned species among our least palatable members of the genus.

Grazing Response: Increasers, typically ungrazed and *E. canadensis*, in particular, producing an abundance of easily dispersed seed.

Notes: A large genus of about 200 species, the majority of these of boreal and temperate zones; locally, our species are especially prominent in the foothills and cordillera; with the exception of *E. acris* var. *debilis* and *E. aureus*, none of the above mentioned species is particularly attractive, their value lies primarily in their early successional response on clearings and disturbances in wooded regions, preferable to non-natives that ultimately are more persistent and aggressive.

Erigeron caespitosus Nutt. - Tufted Fleabane



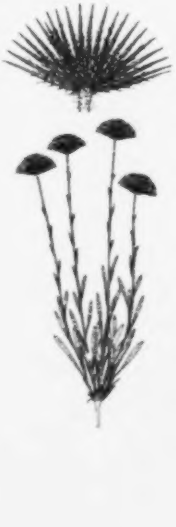
Growth Habit: Perennials from stout, woody taproots and branched woody caudices; stems **5-30 cm. tall, several, curved at base**, becoming erect, **rough with short, stiff, spreading coarse hairs** (hairs less than 0.5 mm. long).

Blades: Leaves **entire, the basal and lower cauline largest, oblanceolate-narrowly spatula-shaped**, the top rounded, stalked, **triple-nerved**; cauline leaves narrower, much smaller upward; blades **short coarse-hairy on both surfaces, grey-green.**

Inflorescence: Heads **few or solitary**, the involucres **4-7 mm. high, white coarse-hairy and glandular**, somewhat overlapping, thickened on the back, purple-suffused upward; **rays well developed, 5-15 mm. long, white or sometimes pale pink-blue**; pappus in 2 series, fine, hair-like.

Similar Species:

1. ***Erigeron pumilus*** Nutt. - Hairy Daisy
   Restricted to the southern prairie region where generally less abundant. Grows in dry open grassland, on dry slopes.
   Differs as follows:
   - Hairs longer, white, spreading (as seen on stems, leaves, involucres).
   - Leaves narrower, linear to narrowly oblanceolate.
   - Cauline blades varying from much to little reduced upward.

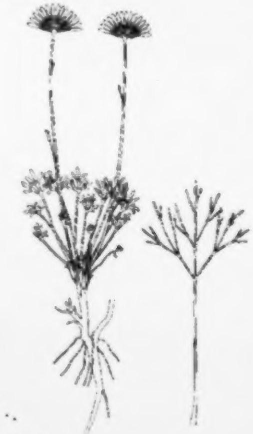


2. ***Erigeron compositus*** Pursh - Compound Fleabane

Found in all ecoregions except the boreal forest. Uncommon in the parkland. Grows on dry, often calcareous ledges and slopes, on rocky, eroded banks.

Distinguished as follows:

- Small plants with mostly leafless stems to 15 cm. tall.
- Leaves several times divided into 3's, the segments narrow (to 1 mm. wide).
- Foliage glandular, with white spreading hairs.
- Bracts purple-tipped, rays short (sometimes absent), white to pink-blue.



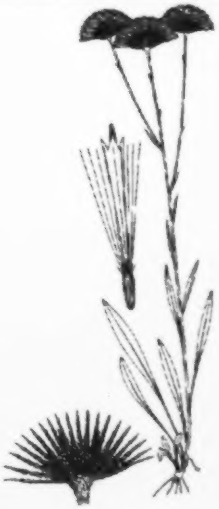
Habitat & Distribution: Very common in southern regions, with isolated populations in the northern parkland area. Grows in open, dry places: in open grassland, on rocky, exposed hillsides and slopes.

Forage Value: Poor, the smaller, hairy fleabanes rated considerably lower in palatability than larger, smooth, more leafy species; they can, however, provide limited amounts of emergency forage, especially to sheep and game.

Grazing Response: Increasers, the woody taproots allowing for good resistance to heavy trampling, also increasing drought tolerance.

Notes: From the Greek *eri*, spring, *geron*, an old man, various explanations given, one a reference to the fluffy seed heads, another to the hairy foliage of some species; the specific name alludes to the tufted growth form; fleabane, according to folklore, is derived from an old practice of using bundles of foliage to repel fleas in homes; erigerons were used by native people as astringents and diuretics, for such disorders as diabetes, painful urination and dysentery, also apparently an effective enema; *E. caespitosus*, specifically, was used in decoctions for eye problems, and a tea made from roots effective in treating diarrhea; although ranking among the less showy members of their genus, the small fleabanes nevertheless have a place in arid gardens, the foliage especially attractive; they also are effective in erosion control and providing cover on exposed, dry sites, persisting when less hardy species decline.

Erigeron glabellus Nutt. ssp. *pubescens* (Hook.) Cronq. - Smooth Fleabane



Growth Habit: Biennial or perennial from a simple to branched caudex and a fibrous root system; stems **1-6 dm. tall**, bases often reclining or plants mostly erect, stems solitary-several, **moderately coarse-hairy with rough spreading hairs**, at least some of the hairs with clear cross-walls.

Blades: Basal blades **stalked, oblanceolate, 4-12 cm. long, entire or with scattered teeth; cauline blades much smaller**, bract-like near summit; **leaf hairs like those of stems, the blades more or less green, with only 1 prominent nerve**.

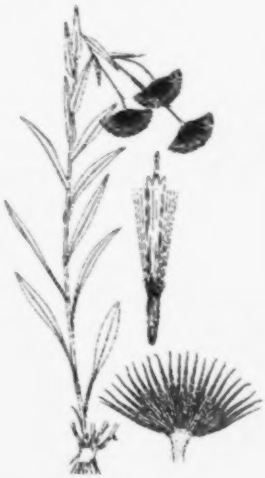
Inflorescence: Heads 1-10, the involucres 5-10 mm. high, **coarse-hairy**; bracts **narrow, long-pointed, dark in the centre, with pale margins; rays well developed, narrow, numerous (125 +), 8-15 mm. long**, mostly **pink or blue**, sometimes whitish (transitional to *E. asper*); achenes 2-nerved, pappus fine, hair-like, usually with some outer bristles.

Related Species:

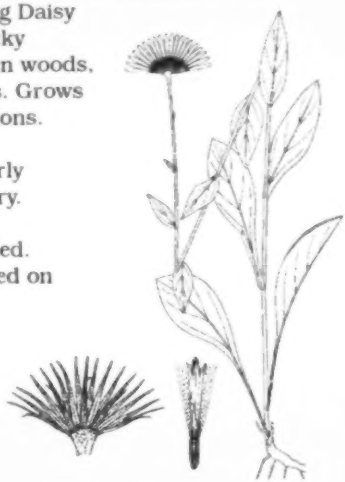
1. Ssp. ***glabellus***
   Less common, apparently more often in drier sites than var. *pubescens*.
   Differs as follows:
   - Plants generally less hairy, often nearly hairless.
   - Hairs mostly without cross-walls.
   - Stems hairs, when present, appressed, short.

Similar Species:

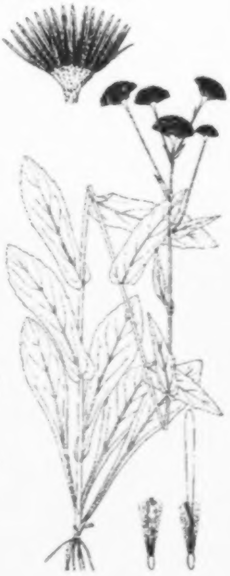
1. ***Erigeron speciosus*** (Lindl.) DC. - Showy Fleabane
   Restricted to southern regions where a common component of foothills and montane grassland.
   Differs as follows:
   - Stems very leafy, the leaves little reduced except at summit; the largest at about the middle, these 1-2 cm. wide, ovate-lanceolate.
   - Blades hairless to coarse-hairy, usually conspicuously ciliate-margined.
   - Blades mostly triple-nerved.
   - Involucres glandular.
   - Heads often more numerous, 1-15 (20), very showy.
   - Rays more consistently blue.



2. **Erigeron peregrinus** (Pursh) Greene ssp. **callianthemus** (Greene) Cronq. - Wandering Daisy
Restricted to the southern Rocky Mountains where found in open woods, along trails, in moist meadows. Grows from montane to alpine elevations.
Differs as follows:
   - Tall plants (to 7 dm.), nearly hairless to moderately hairy.
   - Lowest blades largest, oblanceolate-spatula-shaped.
   - Leaves with veins depressed on the upper surface.
   - Bracts long-pointed, purplish above, densely glandular.
   - Rays large (8-25 mm. long, to 4 mm. broad), deep rose-purple.



3. ***Erigeron philadelphicus*** L. - Philadelphia Fleabane
Common in the parkland and boreal forest, with disjunct populations in the southern Rocky Mountains and Cypress Hills. Grows in moist, boggy woods, in marshy places, on shores, sometimes on disturbances.
Distinguished as follows:
   - Plants short-lived perennials, more rarely biennial or even annual.
   - Foliage sparsely to moderately hairy with jointed white rough hairs.
   - Lowest leaves oblanceolate, toothed.
   - Stem leaves with basal auricles.
   - Rays numerous, very narrow, usually pink-purple.



Habitat & Distribution: Distributed throughout, most common in the foothills, montane and parkland regions. In the prairies, it is restricted to areas with better soils. Found in fescue grassland, open woods, willow thickets, in moist meadows, also in moister habitats in dry regions: in depressional areas, lush draws and coulee slopes.

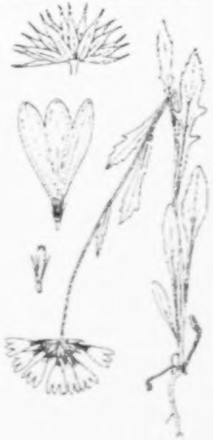
Forage Value: Poor; although the larger smooth fleabanes are considerably more succulent than small hairy species, and are grazed to a greater extent, particularly by sheep and game, production and overall palatability is generally inferior to that of choice range species.

Grazing Response: Increasers.

Notes: The specific name *glabellus* as well the common name, translating "smooth", is somewhat erroneous, as the plants are usually at least somewhat hairy; typical of many large native fleabanes, all mentioned species are spectacular, some now grown as ornamentals and are also recommended for use in wild flower mixes used in reclamation, *E. speciosus* and *E. peregrinus* best suited to moister regions, *E. glabellus* particularly well adapted to a wide variety of soil and moisture regimes; it is interesting to note that a number of species like *E. glabellus*, although normally not suited to poorest soils, will often respond well once these sites are disturbed, the disturbance functioning to break up hard, crusted soil and also allowing for a release of soil nutrients.

GAILLARDIA Foug. - Gaillardia

Gaillardia aristata Pursh - Gaillardia



Growth Habit: Perennials from slender taproots; stems one several, 2-6 dm. tall, little branched, coarse-hairy with white multicellular hairs, green or purple-striped.

Blades: Leaves both **basal** and **cauline (alternate)**, to 15 cm. long, lanceolate-oblanceolate in outline, entire to more commonly **coarsely toothed or pinnately divided**; lower leaves largest, stalked, the upper smaller, stalkless; blades **grey-green, roughened, moderately white-coarse-hairy on both sides**.

Inflorescence: Heads solitary to few, long-stalked, the stalks densely **woolly just below heads**; involucres 2-3 cm. wide, the bracts subequal, in 2-3 series, coarse-hairy, the top **long-pointed** and often spreading, purple-suffused at base and along upper margins; **rays 1-3 cm. long, yellow and usually purple at base**, coarse-hairy on the back, the **top 3-toothed**; disc **purplish-brown** (rarely yellow), the corollas densely hairy above; receptacle subspherical, with bristles that exceed achenes; achenes obpyramidal, with stiff hairs; pappus present, **of 6-10 awned scales**.

Habitat & Distribution: Common in southern regions. Found in open places: fescue grassland, in prairie grassland (except in poorest soils), sometimes in depressional areas in driest regions. Common on disturbances, especially known as a roadside species.

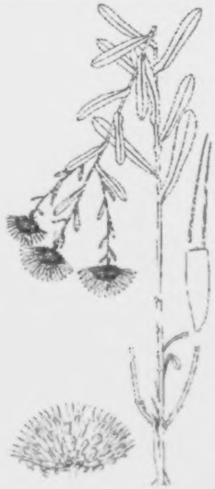
Forage Value: Poor, considered unpalatable and of little value as a grazing species.

Grazing Response: An increaser.

Notes: About a dozen species, mostly N. American, several commonly cultivated as ornamentals; named for Gaillard de Marentonneau, a French botanist; *aristata*, a reference to the bristles on the receptacle; also known as brown-eyed Susan; gaillardia was used rather extensively by the Blackfoot Indians, infusions of both roots and leaves used to treat gastroenteritis, eye and skin disorders, saddle sores, falling hair, and flower heads were infused to make a foot bath; gaillardia shows potential as as early successional reclamation species, often a pioneer on disturbances, the roots sometimes becoming horizontal and rhizome-like; although somewhat difficult to handle, it can be seeded and harvested with conventional machinery.

GRINDELIA Willd. - Gumweed

Grindelia squarrosa (Pursh) Dunal - Gumweed



Growth Habit: Taprooted biennial/short-lived perennial; **stems 1-6 dm. tall**, hairless, **branched, spreading, suffused with purple**.

Blades: Leaves **alternate, cauline, numerous, narrowly oblong-oblanceolate**, firm, **hairless, resinous-dotted**, the margins entire or with sharp, thick teeth; lowest blades short stalked, the upper stalkless, clasping.

Inflorescence: Heads **radiate, several-numerous, 2-3 cm. across**, in a flat-topped cluster; bracts **overlapping, in several series**, firm, narrow, pale-thickened-based, green and reflexed at the tip, **densely yellowish-sticky and resinous**; receptacle flat, naked; rays **yellow, entire**, achenes obscurely 4-5 ribbed, the top truncate, **pappus of a few early deciduous awns.**

Habitat & Distribution: Distributed throughout most regions, more common southward. Found in open places: on dry, sometimes eroded slopes, in prairie grassland, in depressional areas, on slough margins and saline flats, on roadsides. An indicator of saline and Solonetzic sites.

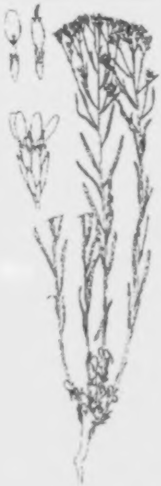
Forage Value: Poor; gumweed is unpalatable to all classes of livestock as well as game, the foliage stiff and sticky and strongly scented.

Grazing Response: An increaser and indicator of overgrazing; the plants are left ungrazed, thus remain vigorous and capable of maturing a seed crop, and spread quickly on abused sites, in waste places, and in disturbances on rangeland, often particularly abundant along trails and around dugouts and gates.

Notes: Named in honor of David Hieronymus Grindel (1776-1836), a Russian professor and botanist; *squarrosa* a reference to the characteristic spreading and recurving of the bract tips; medicinal uses of the plants were varied, the gummy top growth and buds containing resin, useful in treating asthma, dry coughing, and whooping cough, also taken as a stomach tonic for indigestion, and tinctures and teas used for kidney and bladder disorders; the Blackfoot Indians made root decoctions for liver trouble and as a spring purge; external uses involved washing sores, wounds, rashes with gumweed solutions, and applying poultices to breaks and sore joints; *G. squarrosa* is often a pioneer on denuded sites and as such is an important species in providing cover and in controlling wind and water erosion on infertile and alkaline or saline soils that characteristically support little other vegetation; the lack of "fluffy" seeds implies that the species is a promising candidate for development on a large scale.

GUTIERREZIA Lag. - Broomweed

Gutierrezia sarothrae (Pursh) Britt. & Rusby - Broomweed



Growth Habit: **Semi-woody plants from thick, woody taproots** and **branched, woody crowns**; stems 1-5 dm. tall, **numerous, erect, slender, brittle and semi-woody at the base**, finely but very roughly hairy; **stems "broomy"**.

Blades: Leaves alternate, **numerous, linear, 2-4 cm. long**, roughened-finely hairy and **glandular-pitted, mostly cauline and little reduced upward.**

Inflorescence: **Heads small, numerous**, clustered in terminal corymbs; **involucres 2-4.5 mm. high**, the **bracts thick and leathery, overlapping**, pale-thickened-based, the tips mostly erect, ascending, **densely glandular glutinous**; receptacle naked but pitted; heads **radiate**, the **rays few, yellow, entire, to 3 mm. long**, the disc flowers yellow, few; achenes 5-angled, with a **pappus of several narrow scales**.

Habitat & Distribution: Common in the prairie and parkland areas, occasional in the foothills region. Grows in dry prairie grassland, on exposed, often eroded slopes. Tolerant of poor, infertile soils but not highly alkaline or saline sites.

Forage Value: Poor, the plants avoided by livestock except sometimes in early spring, the young foliage somewhat palatable and also often appearing before better quality species green-up; broomweed contains the toxin saponin, which can cause death and birth abnormalities if large quantities are ingested; under normal conditions, when a small amount of foliage is consumed in combination with other species, fatalities are rare; poisoning is most likely to occur in early spring when toxicity is highest and alternative forage is often scarce, and in overgrazed pastures where broomweed has invaded.

Grazing Response: An increaser, the heavy taproots and foliage very resistant to drought and trampling, and capable of spreading when better quality species are grazed out.

Notes: Named after Piedro Gutierrez, a Spanish botanist; the specific name from the Latin *sarothrum*, meaning broom, this and the common name referring to the dry, brittle stems; medicinal uses of the plant were rather limited, but the Blackfoot people were known to boil roots and inhale steam for respiratory problems; broomweeed plays a role in protecting soil against erosion in the absence of other species on depleted rangelands and on exposed slopes which are often naturally sparsely vegetated.

HAPLOPAPPUS Cass. - Ironplant

Common Characteristics

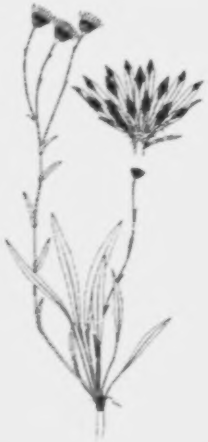
- Taprooted perennials, sometimes with a woody base.
- Leaves alternate, varying from entire to toothed-pinnatifid.
- Heads solitary to several, mostly radiate.
- Receptacle flat to slightly convex, naked.
- Bracts imbricate, in several series, usually with white-thickened bases and green herbaceous tips, sometimes the outer leaf-like.
- Rays yellow, the disc few-many flowered, usually yellow.
- Style branches flattened.
- Achenes angled, striped, or smooth.
- Pappus whitish or reddish, fine and hair-like.

Key to Haplopappus

1. Leaves grey-green and "feathery" pinnately dissected and again lobed; upland species. *H. spinulosus*

Leaves entire to merely spiny toothed; of moist, usually saline sites. *H. lanceolatus*

Haplopappus lanceolatus (Hook.) T. & G. - Lance-leaved Pyrrocoma



Growth Habit: **Perennials from a stout taproot** and simple to branched, **distinctly shredded-fibrous crown; stems 2-4 dm. tall, 1-several, curved at the base**, glabrous to sparsely hairy, often red-purple-tinged.

Blades: **Basal blades conspicuous, several, linear-lanceolate**, short petiolate, **4-20 cm. long, entire or with remote, shallow spiny teeth; cauline blades few, reduced**; leaves glabrous to sparsely pubescent, **firm, reticulate-veiny**.

Inflorescence: **Heads several**, the peduncles mostly elongate, forming a corymb-like arrangement; involucres 5-10 mm. high, the bracts firm, **well imbricate**, glabrous to sparsely pubescent, **whitish-based, with acute green tips, often purple-tinged**; rays **yellow**, 5-10 mm. long; achenes elongate, to 4 mm. long, pappus off-white, **fine**.

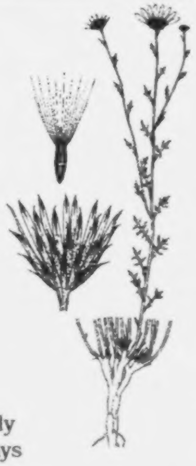
Habitat & Distribution: Frequent in all ecoregions except the boreal forest. Grows in open prairie grassland, in depressional grassland, in moist saline meadows, on alkali flats. An indicator of moderate alkalinity and salinity.

Forage Value: Poor for the genus as a whole, most species with inferior palatability, and some southern species toxic, containing an alcohol tremetol which is excreted by lactating animals through their milk.

Grazing Response: Increasers but our species not invasive, occurrences typically rather sparse.

Notes: The generic name originates from *haplous*, simple, and *pappos*, seed down, in reference to the pappus, specific and common names because of the leaf shape; a group with unusually variable physical appearance ranging from its diminutive alpine members to robust shrubby species in the south. *Note:* Locally *H. lyallii* is common on dry alpine slopes, growing to 15 cm. tall; leaves are spatulate-oblanceolate, and the entire plant glandular hairy.

Haplopappus spinulosus (Pursh) DC. - Spiny Ironplant



Growth Habit:	Perennials from a strong woody taproot and woody crown; stems mostly several, 1-4 dm. tall, moderately to sparsely woolly-pubescent.
Blades:	Blades 1-6 cm. long, both basal and cauline, **linear-oblong in outline, 1-2 times pinnatifid into spiny-toothed linear (feathery) segments; leaves blue or grey-green**, moderately to densely woolly-tomentose.
Inflorescence:	**Heads rather small** (disc to 1.5 cm. wide) at the ends of branches; involucres 5-8 mm. high, **the bracts well imbricate**; in several (4-6) series, **whitish-based, greenish and spiny-tipped**, sparsely to densely pubescent; **rays and disc yellow**, the rays 7-10 mm. long; achenes short, to 2.5 mm. long, densely pubescent; pappus off-white, fine.
Habitat & Distribution:	Common in southern prairie and parkland regions. Grows in dry prairie grassland, on open slopes and hillsides.
Forage Value:	Poor, plants unpalatable at all growth stages.
Grazing Response:	An increaser; although never particularly abundant, *H. spinulosus* is usually left ungrazed, also is resistant to trampling and very dry conditions that allow it to thrive when better quality forage is depleted or negatively affected by drought.
Notes:	The specific and common names both in reference to the spiny-tipped leaf segments; locally, our species were of little value to aboriginal people, some southern woody members of the genus (although toxic) used to some extent for medicinal purposes; *H. spinulosa* has considerable importance because of its soil binding and drought tolerance properties, the blue-green, feathery foliage also very attractive and suitable for use in dry, sunny gardens.

HELIANTHUS L. - Sunflower

Common Characteristics

- Annual or perennial herbs with taproots or rhizomes, these fleshy-thickened in some species.
- Leaves opposite, or the upper sometimes alternate, simple, toothed to entire.
- Heads radiate, large and showy, solitary or few.
- Bracts mostly green-herbaceous, in several series, more or less overlapping.
- Receptacle flat to low-conic, chaffy.
- Rays large, yellow, the disc flowers numerous, yellow to brownish-purple, perfect, fertile.
- Achenes thick, compressed at right angles to the bracts, more or less 4-angled, hairless, with two early deciduous awns.

Key to Helianthus

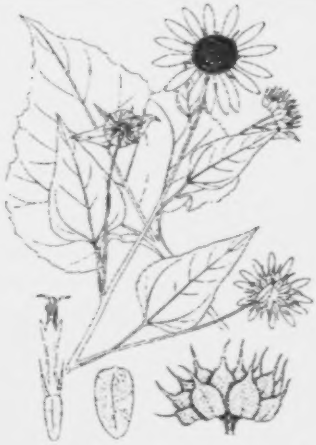
1. Perennials; lower leaves opposite. *H. nuttallii*

Annuals; leaves mostly alternate. 2

2. Leaves lanceolate-ovate, the bases narrow wedge-shaped; hairs not harsh; bracts rather evenly scabrous across back, without longer marginal hairs. *H. couplandii*

Leaves broader-ovate and often cordate; hairs rough-harsh; involucre bracts scabrous and with longer, white hairs on margins. *H. annuus*

Helianthus annuus L. ssp. ***lenticularis*** (Lindl.) Cockerell - Common Annual Sunflower



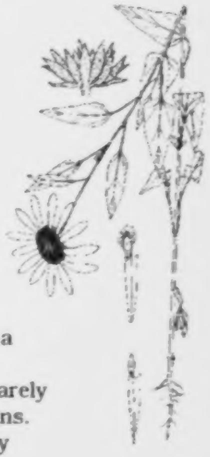
Growth Habit: **Taprooted annual**, the stems **5-12 dm. tall**, with **white roughened-bristly-hairs**.

Blades: **Lowest blades opposite**, stalked, **ovate, toothed, often cordate, firm, roughened-bristly-hairy on both surfaces** with very short and longer hairs (the longer hairs more abundant below); **upper blades similar, alternate**.

Inflorescence: Heads **1-few, large, the disc 2-4 cm. across**; bracts **ovate-lanceolate, abruptly long-pointed, roughened** and **with longer white bristly hairs**, these sometimes sparse but **always present as marginal hairs**; disc usually **reddish-purple**, rays yellow, showy; the chaff 3-awned, short hairy at the tips; achenes thick, 4-angled, pappus of 2 awns.

Similar Species:

1. ***Helianthus couplandii*** Boivin - Annual Sunflower
Found in much the same range, but generally less common, and restricted to southern regions. Grows on open, often eroded slopes, in sandy places.
Differs as follows:
    - Plants averaging somewhat smaller, rarely 1 m. tall.
    - Plants not as harshly roughened (at least on stems).
    - Leaves narrower (ovate-lanceolate), more often entire, rarely cordate-based.
    - Heads smaller, the disc 1-2.5 cm. wide.
    - Bracts lanceolate, gradually tapering to a pointed tip.
    - Bracts evenly roughened-bristly-hairy, rarely with longer hairs on the backs or margins.
    - Middle awn of disc bracts conspicuously white-bearded at the tip.



2. ***Helianthus nuttallii*** T. & G. - Common Tall Sunflower
Frequent throughout most regions, occasional in the boreal forest. Grows in moist meadows, open woods, on shores, in springy and seepage (often calcareous) areas. The similar *H. subrhomboideus*, found throughout the prairies (parkland), has broader bracts glabrous across back, disc red-brown, and leaves very rough/pustulose, and some broad-4-sided.
Distinguished as follows:
    - Rhizomatous perennials 5-15 dm. tall.
    - Foliage with short, stiff, rough hairs.
    - Blades lanceolate, often toothed, the upper smaller and sometimes alternate.
    - Disc yellowish, 1.2-3 cm. across.
    - Bracts narrow-lanceolate, rather loose, with rough hairs on the back, and margins distinctly hair-fringed.
    - Rays yellow, 1.5-3 cm. long.

Habitat & Distribution:

Fairly common in southern regions and in the northern parkland area. In the prairie region it is especially common on clay and heavier soils, on eroded and sometimes calcareous clay slopes and in the seepages and drainage channels found in these areas. Also on roadsides and waste places. Not clearly separated from the introduced sunflower, cultivated for its seed.

Forage Value:

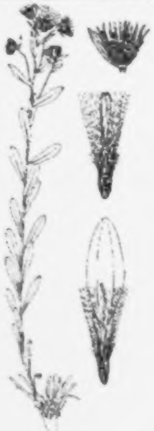
Poor, members of the genus with low palatability, although sometimes eaten rather sparingly when better forage is scarce, and flower heads are occasionally cropped.

Grazing Response: Increasers, both annual and perennial species spreading when heavy grazing depletes more palatable range plants; the rather specific habitat requirements of perennial sunflowers tends to restrict populations.

Notes: From the Greek *helios*, sun, and *anthos*, flower; *annuus* an obvious reference to annual growth habit; along with maize, sunflowers were cultivated by native people, the seeds used extensively for flour, or eaten raw or roasted; oil extracted from the seeds was applied as a face and body lotion and as a hair tonic, also an ingredient in making candles and soap; hot mixtures of crushed roots were used to relieve rheumatism, and cold poultices used on blisters and for headaches; infusions of plants were used in the treatment of coughs, bronchitis, kidney problems and malaria; in addition, dyes were extracted from sunflowers, the seeds producing a purple or black color, and the flowers a yellow dye; besides their obvious ornamental qualities, *Helianthus* species are recommended for wild flower mixes used in reclamation; *H. annuus*, as is characteristic of annuals, is a pioneer on disturbances, has good seed viability and gives immediate cover; *H. nuttallii* has a wider distribution, but in driest zones must be restricted to moist areas, where, interestingly, it often naturally associates with little bluestem; sunflower seed lacks the "fluff" typical of many members of its family, thus is much easier to handle with machinery.

HETEROTHECA Cass. - Golden Aster

Heterotheca villosa (Pursh) Shinners var. ***hispida*** (Hook.) Harms - Golden Aster



Growth Habit: Perennial (ours) herbs **with a strong woody taproot and a woody caudex**; stems **1-5 dm. tall, several, ascending**, rather **conspicuously white-long-hairy, often glandular.**

Blades: Leaves **alternate**, mainly **cauline** and **little reduced**, (lowest early deciduous), **oblong-oblanceolate, 2-5 cm. long**, nearly stalkless or short-stalked, **entire or remotely toothed**; hairs **rough, spreading, white** (upper surface sometimes nearly hairless) and **also glandular**.

Inflorescence: Heads **few** (solitary) **to several** at branch ends, involucres **5-10 mm. high**; bracts **narrow, overlapping**, green with pale portions at bases and on margins, the tips pointed and **sometimes purplish**; heads **radiate**, the rays **yellow, to 10 mm. long**, disc flowers **yellow**; receptacle flattish, naked; achenes flattened, hairy; pappus double, the **inner of numerous brownish fine, hair-like bristles, the outer of short scales.**

Related Species:

1. Var. ***villosa***
   Differs as follows:
   - Leaves with more appressed non-glandular hairs.

Habitat & Distribution:

Very common, found in all ecoregions except the boreal forest. Found in open fescue and foothills grassland, in sandy grassland. An indicator of subxeric sites in foothills to subalpine regions.

Forage Value:

Fair, both nutritional rating and palatability moderate, although heavy utilization of the species is an indication of rangelands in a deteriorated condition.

Grazing Response:

An increaser; golden aster establishes readily from seed, and spreads when better quality forage declines under grazing pressure; the strong woody taproot system is very resistant to both trampling and drought, giving the species a further competitive advantage.

Notes:

Syn. *Chrysopsis villosa*, the generic name translating gold aspect, this and the common name describing the showy flowers; *villosa*, in reference to the dense hairs on the foliage; golden aster establishes readily on disturbances, and is persistent and tolerant of very droughty conditions and as such can be recognized as a potential reclamation species in dry exposed sites, especially in loose sandy soil.

HIERACIUM L. - Hawkweed

Common Characteristics

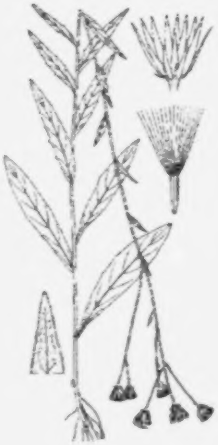
- Fibrous rooted perennials, either with a caudex or an elongated rhizome.
- Juice milky.
- Leaves entirely basal or alternate, entire to toothed.
- Heads few-numerous in a corymb or panicle.
- Involucre bracts mostly overlapping.
- Receptacle naked.
- Flowers all ligulate, perfect, yellow, orange or white.
- Achenes rounded to prismatic, narrowed at the base, truncate (sometimes narrowed) at top, strongly ribbed.
- Pappus of brownish fine, hair-like bristles.
- Hairs often star-shaped.

Key to Hieracium

1.	Flowers white; woodland species.	*H. albiflorum*
	Flowers yellow.	2
2.	Stems leafy; leaves with stout, stiff marginal hairs; widespread species.	*H. umbellatum*
	Stems essentially leafless, with stellate hairs; leaves glabrous or sparsely hairy; species of higher elevations.	*H. triste*

Hieracium umbellatum L. - Narrow-leaved Hawkweed

Growth Habit: Perennials with **fibrous roots** and elongating caudex; stems **2-10 dm. tall, hairless or nearly so below**, with **short star-shaped hairs and usually with a few stout hairs above; juice milky.**

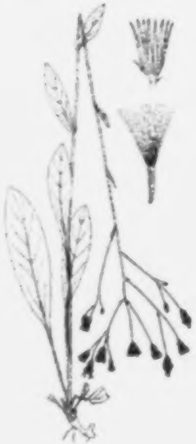


Blades: **Basal and lower cauline leaves smallest, early deciduous**, middle and upper ones **well developed, ovate-lanceolate**, nearly stalkless, narrowed to the base; uppermost blades somewhat smaller, **broader-based, sometimes clasping**; blades with short, stiff roughened hairs and **often short star-shaped hairs on both surfaces**, the margins **rolled, with a few sharp teeth, hair-fringed with short, stiff hairs.**

Inflorescence: Heads **ligulate**, **yellow**, **usually several**, the involucres 6-13 mm. high; bracts **overlapping**, **dark green to green-black**, finely hairy to hairless, often with a **few dark, stout glandular hairs**; achenes **rounded-prism shaped**, averaging 3 mm. long; **pappus fine, hair-like, brownish**.

Similar Species:

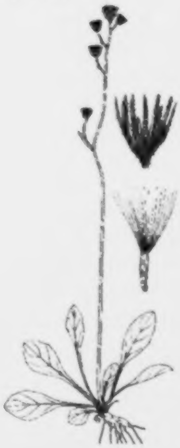
1. ***Hieracium albiflorum*** Hook. - White Hawkweed
   Found primarily in the southern Rocky Mountain region, also in the Cypress Hills. Grows in open woods.
   Distinguished as follows:
   - Stems conspicuously long-hairy, at least below.
   - Lowest leaves oblong-lanceolate, hairy, especially on the midrib below.
   - Upper leaves reduced, less hairy.
   - Involucres greenish-black, often glandular-hairy at the base.
   - Rays white to cream-colored.



2. ***Hieracium triste*** Willd. ssp. ***gracile*** (Hook.) Calder & Taylor - Hawkweed

Found in much the same regions as *H. albiflorum* but absent from the Cypress Hills. More common at higher elevations. Distinguished as follows:

- Slender plants 1-3 dm. tall, stems stellate-pubescent.
- Leaves mostly basal, long stalked, oblanceolate, entire to toothed.
- Leaves glabrous to somewhat hairy.
- Involucres and pedicels black-hairy; flowers yellow.



Habitat & Distribution: Common throughout most regions, less frequent in the prairies. Found in open woods, moist grassland, in shrubby thickets, in clearings, on roadsides.

Forage Value: Good, the entire plant utilized extensively by game, livestock also grazing it readily, preferring leaves and flower heads over stems which become stiff and woody; all *Hieracium* species (surprisingly even those with densely hairy foliage), rate about equally as range plants, perhaps somewhat superior to the similar hawksbeards (*Crepis* species).

Grazing Response: Decreasers; with the exception of the introduced *C. tectorum*, which is now a troublesome weed, both *Hieracium* and *Crepis* species decline under grazing pressure; none of the species (except perhaps *H. umbellatum*, which can form rather large stands) in either genus is ever very abundant, and they appear to have rather low resistance to heavy utilization and show poor competitive ability.

Notes: Syn. *H. canadense*; *Hieracium*, from *hierax*, hawk: hawks, according to folklore, supposedly gained sharper vision from the use of the plants; *umbellatum*, somewhat erroneously describing the inflorescence; also known as umbellate hawkweed; native hawksbeard and hawkweed species are rather varied in appearance, the flowers ranging in color from white to deep yellow, and foliage from hairless to densely long-white hairy; some have considerable ornamental value, and all are important components of native rangelands and are thus recommended for use in reclamation seed mixes; *H. umbellatum* appears to be one of the most aggressive species, this most likely because of its pseudo-rhizomatous growth habit.

HYMENOXYS Cass. - Rubberweed

Common Characteristics

- Perennial (ours) herbs from strong woody taproots and thick branched crowns.
- Leaves cauline and alternate or all basal, entire or pinnately divided, usually glandular-pitted.
- Heads solitary or in a flat-topped cyme.
- Bracts mostly herbaceous, in 2-3 similar or dissimilar series.
- Receptacle naked.
- Heads radiate, the rays bright yellow, 3-toothed; disc flowers yellow.
- Achenes 5-angled, hairy.
- Pappus of 5-8 pale scales, these often awned.

Key to Hymenoxys

1. Leaves basal and cauline, green, 3-7 divided into very narrow segments; heads 2-5 in a flat-topped cluster; involucre of dissimilar bracts in 2 series, the outer partially united. *H. richardsonii*

Leaves all basal, silvery, entire; heads solitary; involucre bracts similar, in 2-3 series. *H. acaulis*

Hymenoxys richardsonii (Hook.) Cockerell - Colorado Rubber-plant

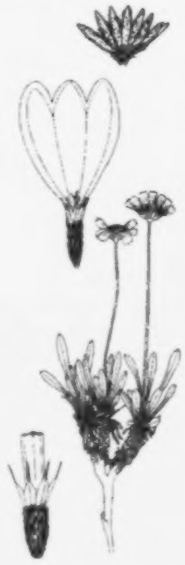
Growth Habit: Perennials **from woody taproots** and branched, stout, woody caudices; **stems evident, 1-3 dm. tall**, several, branched in the inflorescence, ridged, usually somewhat hairy; **crown with conspicuous white-woolly tufts of hair** and also often old leaves.

Blades: Leaves **both basal**, (these tufted) **and cauline, divided into 3-7 linear segments**; leaves **fleshy, green**, hairless to sparsely hairy, **pitted with sunken glands**.

Inflorescence: Heads **generally several in a flat-topped cyme**, the **disk 7-15 mm. wide, involucre of 2 dissimilar series**, the inner bracts not united, their **upper margins jagged-fringed; outer bracts united at the base, the tips entire**, pointed; bracts hairy and **especially the outer glandular-pitted; rays bright yellow, to 7 mm. long, 3-toothed**; disc yellow; achenes 5-angled, hairy; pappus scales 5-6, these long-pointed.

Similar Species:

1. ***Hymenoxys acaulis*** (Pursh) Parker - Butte Marigold
Common in the prairies, also found occasionally in the southern foothills region. Grows in dry grassland, on eroded and rocky hillsides.
Differs as follows:
    - Stems leafless, to 3 dm. tall.
    - Blades 2-8 cm. long, linear-oblanceolate, entire.
    - Foliage grey-green with silvery-silky hairs.
    - Bracts similar.
    - Heads mostly solitary, larger (disc to 20 mm. wide, rays to 15 mm. long).



Habitat & Distribution:

Common in prairie and parkland areas, occasional in the southern foothills region. Grows in open, dry prairie grassland, on exposed slopes, on dry, open, often rocky hillsides.

Forage Value:

Poor, the rubber latex content in plants toxic to sheep and to a lesser degree also to cattle; Colorado rubber-plant is unpalatable, but lethal quantities are sometimes consumed on badly overgrazed rangelands, also early in the season and in very dry conditions when rubber-plant is often more green and succulent than alternative forage; all aerial portions of the plant are toxic and remain so throughout the growing season, death a result of respiratory failure when sufficient amounts are ingested; *H. acaulis*, although also unpalatable, is essentially non-toxic.

Grazing Response:

Increasers, the thick woody taproots and crowns exceptionally resistant to both heavy trampling and severely dry conditions, and spreading when less resilient species die back as the result of heavy grazing.

Notes:

Syn. *Actinea richardsonii*; from the Greek *hymen*, membrane, and *oxys*, sharp, a reference to the pappus scales; also known as pingue, referring to the oily, resinous leaves; *H. acaulis*, most appropriately called butte marigold, makes a splash of silvery foliage contrasted by the showy, marigold-like flowers; it is well adapted for use in dry flower gardens, and both *Hymenoxys* species valued as they provide cover and prevent erosion on steep, unstable slopes; they are more suitable for development than many composites as they lack the fluffy pappus on seeds.

IVA L. - Marsh Elder

Common Characteristics

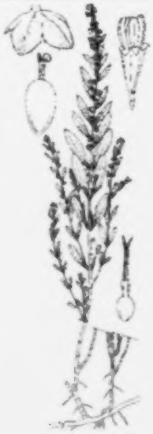
- Annual or perennial herbs.
- Leaves opposite below, sometimes alternate above.
- Heads discoid, greenish, either axillary and solitary or in dense panicles.
- Flowers imperfect, the pistillate marginal, with a tubular or obsolete corolla; staminate with an entire style and filaments united but anthers mostly separate.
- Involucres of 1-3 series of equal to imbricate bracts, these sometimes united.
- Receptacle with linear-spatulate chaffy bracts.
- Achenes ovoid, compressed parallel to involucre.
- Pappus absent.

Key to Iva

1. Annuals 5-20 dm. tall; leaves broad, long-stalked; heads clustered in dense panicles. *I. xanthifolia*

Perennials to 5 dm. tall, from rhizomes; leaves narrow, sessile; heads solitary in upper axils. *I. axillaris*

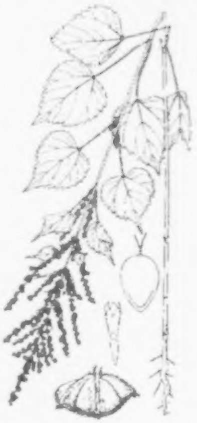
Iva axillaris Pursh ssp. ***axillaris*** - Poverty-weed



Growth Habit:	**Perennials from long creeping rhizomes, often forming large patches; stems 1.5-5 dm. tall, strongly ridged**, glabrous to somewhat pubescent.
Blades:	**Leaves small, 1-5 cm. long**, glabrous to sparsely villose, **oblong-linear, entire, mostly sessile, thick and somewhat fleshy**, glabrous to sparsely pubescent; **leaves of inflorescence alternate**.
Inflorescence:	**Heads solitary in upper leaf axils**, nodding on short peduncles, **small** (involucres 2-4 mm. high); bracts 4-6, united basally; pistillate flowers 5-8, **with tubular corollas about 1 mm. long**, not enclosed by scales; staminate flowers 10-20; achenes ovoid, **pappus absent**.

Similar Species:

1. ***Iva xanthifolia*** Nutt. - False Ragweed
A species with much the same distribution as *I. axillaris*, found along roads, in ditches and along irrigation canals, in waste places.
Differs as follows:
    - Coarse annuals to 20 dm. tall.
    - Blades large (to 20 cm. long), ovate, cordate, stalked, coarsely serrate.
    - Heads clustered in dense panicles.
    - Corolla of pistillate flowers less conspicuous.
    - Pistillate flowers with scales (inner bracts) partly enclosing the achenes.



Habitat & Distribution:

Frequent throughout the prairie and parkland (including the northern parkland) regions. Found in dry, open, often disturbed places: on banks, eroded calcareous slopes, commonly associated with alkaline and saline clay flats.

Forage Value:

Poor, unpalatable at all stages of growth.

Grazing Response:

Increasers, *I. axillaris* with rather specific habitat requirements, a high prominence of the species on alkaline or saline clay flats more often a natural occurrence than an indication of heavy grazing.

Notes:

About 15 species native to North America, the origin of the generic name apparently unknown; *I. axillaris* is often found growing in association with species such as *Distichlis stricta* (salt grass), these vegetation communities with exceptional soil stabilizing properties and valued on sites too alkaline or saline to support a more diverse species composition.

LIATRIS Schreb. - Blazing Star

Common Characteristics

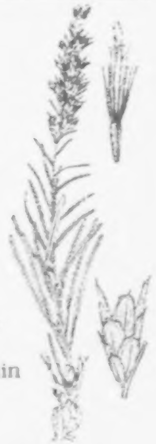
- Perennial herbs from a thickened corm-like root or thickened, elongated caudex.
- Leaves mostly cauline, alternate, narrow, entire, the lower usually largest.
- Blades thick, roughened, pitted.
- Heads discoid, pink-purple, showy, solitary or more often in narrow racemes or spikes.
- Bracts in several series, overlapping, green and often with broad pale (purplish) margins.
- Receptacle naked; flowers pink-purple.
- Achenes cylindrical, narrowed at the base, hairy, 10-ribbed.
- Pappus fine, hair-like, of small stiff hairs or feathery bristles, in 1-2 series, whitish to tawny-purplish.

Key to Liatris

1. Lower leaves 2-4 mm. wide; heads cylindrical, slender; pappus bristles feathery-plumose; species of southern regions. *L. punctata*

Lower leaves 1-2 cm. wide; heads nearly spherical, broad (1-3 cm. wide); pappus not feathery, but barbellate; species of sandy habitats, mostly southern boreal/parkland. *L. ligulistylis*

Liatris punctata Hook. - Dotted Blazing Star



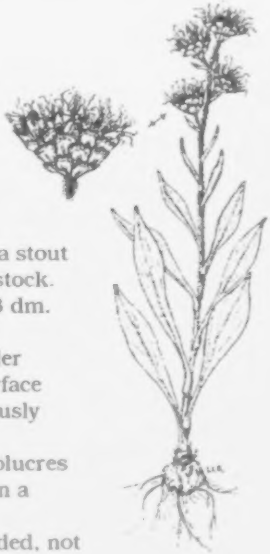
Growth Habit: Perennials **from a well developed corm**, this **sometimes elongate** as a short, stout rhizome; stems hairless, **1-5 dm. tall**.

Blades: Leaves **numerous, firm, linear, 2-4 mm. wide, hairless except for a few stiff, white marginal hairs**; blades **conspicuously pitted, with thick white marginal nerves.**

Inflorescence: Heads **discoid, pink-purple**, several, stalkless, **in an elongate spike**; involucre broadly cylindrical, to **18 mm. high**, the bracts **sharp-short-pointed, pitted**, hairless except for white marginal hairs; flowers few (4-6) per head, the lobes hairless, the tube hairy within toward the base; pappus **whitish, feathery**; achenes cylindrical, hairy, 6-7 mm. long.

Similar Species:

1. ***Liatris ligulistylis*** (A. Nels.) K. Schum. - Meadow Blazing Star
   Generally less common, found primarily in the southern boreal/parkland region. Sometimes found in moist areas (i.e. around sloughs) but is best known as a species of open sandy woods and especially jack pine forests.
   Differs as follows:
   - Plants more strictly arising from a stout corm, without an elongating rootstock.
   - Stems averaging taller, mostly 2-8 dm. tall, red-tinged, hairy above.
   - Blades linear-oblanceolate, broader (to 2 cm.), brighter green, the surface often coarse-hairy, not conspicuously hair-fringed.
   - Heads larger, often fewer, the involucres to 2 cm. high and 1-3 cm. wide, in a rounder-topped raceme.
   - Bracts broad (oval-oblong), rounded, not short-pointed, the upper margins purplish and jagged.
   - Pappus not feathery, often purplish.



Habitat & Distribution:	Common in the south, found in the prairie and foothills regions and in the southern portion of the parkland ecoregion. Grows in open places: in dry prairie grassland, on exposed hillsides, often in sandy soil.
Forage Value:	Poor, foliage unpalatable and of little value as a range species.
Grazing Response:	An increaser, the heavy roots very resistant to trampling and grazing pressure, also left ungrazed under normal conditions, this ensuring the production of an annual seed crop.
Notes:	The generic *Liatris* of uncertain origin, *punctata* referring to the glandular-dotted leaves, the common name adequately describes the showy flowers that bloom from July to September; called crow foot by native people who believed the roots to be eaten in the fall by crows and ravens; the carrot-flavored root was a source of food for Indians, particularly in the spring, and was also boiled and put on swellings, and root teas were used to relieve stomach aches; both our *Liatris* species are spectacular ornamentals, and can be grown quite readily from seed (although this is difficult to handle); *L. ligulistylis*, although very restricted in its range, is of some value in stabilizing sandy soils in jack pine forests, and *L. punctata* with a similar response in southern regions, but with somewhat wider adaptations, especially known to be drought resistant.

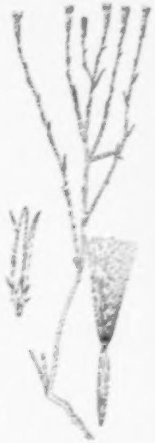
LYGODESMIA D. Don - Skeleton-weed

Common Characteristics

- Annual or perennial herbs from taproots or rhizomes.
- Juice milky.
- Stems firm, branching and sometimes spreading above, striped, hairless.
- Leaves alternate, linear, firm, often few and reduced, scale-like.
- Heads solitary-few at or near the ends of branches.
- Involucres cylindrical, of 4-8 elongate subequal bracts and an outer ring of very short bracts.
- Flowers all ligulate and perfect, pink-purple (rarely white), rather few (3-10) per head.
- Achenes linear, mostly rounded, 4-8 ribbed, narrowed toward top and sometimes basally.
- Pappus fine, hair-like, of soft bristles, these not feathery.

Lygodesmia juncea (Pursh) D. Don - Skeleton-weed

Growth Habit: Perennials from **long, deep-seated rhizomes**; stems 1-4 dm. tall, **branched** from near the base, both main stem and branches **conspicuously grooved**, pale-green/glaucous; **juice milky**.

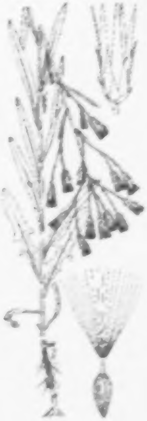


Blades: Leaves mostly **reduced and scale-like, firm**, hairless, with **sharp white spiny tips, lowest blades largest, seldom exceeding 4 cm. long**, but occasionally longer in young shoots; upper leaves much smaller, rather few.

Inflorescence: Involucres 9-15 mm. long, with mostly 5 narrow, principal bracts, these hairless, glaucous, with firm white-nerved margins; very small outer bracts (in several series) also present; flowers **all ligulate, pink**, with an average of 5 flowers per head; achenes linear, 5-7 mm. long, the pappus white, **fine, hair-like**.

Similar Species:

1. ***Lactuca pulchella*** (Pursh) DC. - Common Blue Lettuce
   Common in southern regions, scattered northward.
   Distinguished as follows:
   - Rhizomatous perennials 2-6 dm. tall.
   - Foliage mostly hairless and glaucous.
   - Juice milky.
   - Leaves 5-18 cm. long, oblong to linear-lanceolate, entire to pinnately cleft.
   - Flowers all ligulate, blue.
   - Involucre 15-20 mm. high, bracts overlapping.
   - Achenes with a stout beak, pappus soft, fine, white.



Habitat & Distribution: Common in the prairie and parkland regions, occasional in the foothills ecoregion. Found in dry prairie grassland, especially common in sandy soil, both in vegetated areas and in open dunes and disturbed places.

Forage Value: Poor, members of the genus both unpalatable and producing little forage; as well, there is some evidence that *Lygodesmia* can accumulate toxic levels of nitrates, although documented cases of poisoning are rare.

Grazing Response: An increaser, maintaining vigorous growth on overgrazed pastures, also resistant to heavy trampling and drought.

Notes: From the Greek, *lygos*, a twig, *desme*, bundle and *juncea*, rush-like, this and also the common name appropriately describe the appearance of the plant; skeleton-weed was variously used by native people, an infusion used as a tea to increase milk supply, also to produce a feeling of contentment; decoctions were taken for heartburn, infusions used to treat sore eyes, and the milky juice allowed to harden and chewed as gum; from a reclamation standpoint, *L. juncea* is an important early successional species, frequently colonizing disturbances but also not so aggressive as to prevent the establishment of slower growing climax species. *Note: Lactuca pulchella*, preferring considerably moister habitats, also shows promise as a pioneer on disturbances; propagation of these and other strongly rhizomatous composites by root sprigs is recommended, especially with species having a fluffy seed, and also because vegetative shoots are more vigorous compared to seedlings which are initially delicate and often poor competitors.

MACHAERANTHERA Nees

Common Characteristics

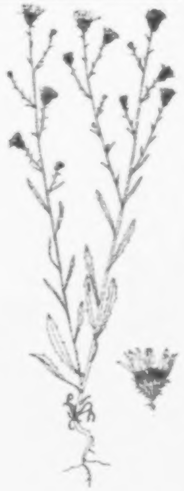
- Annual to perennial herbs from taproots.
- Leaves alternate, either pinnately dissected or spiny-margined.
- Involucre bracts in several series, pale at the base, greenish upward.
- Heads discoid or radiate, the rays whitish to blue.
- Both disc and ray flowers perfect, fertile.
- Pappus hair-like.

Key to Machaeranthera

1.	Leaves grey-green, oblong-spatulate, thick, with spiny margins; rays absent.	*M. grindelioides*
	Leaves finely hairy, narrower and thinner, entire or with a few spiny teeth; rays present; aster-like.	*M. canescens*

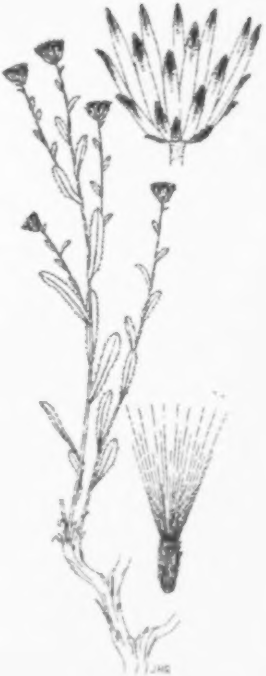
Machaeranthera canescens (Pursh) A. Gray - Canescent Aster

Growth Habit:	Biennials or short lived perennials **from taproots**, branched, the several stems 1-5 dm. tall, **finely pubescent**.
Blades:	**Basal leaves linear-lanceolate to oblanceolate**, short stalked, **to 10 cm. long, entire to remotely toothed, the teeth and apex spiny**; upper blades narrower and reduced; **leaves finely hairy**.
Inflorescence:	Heads several or rather numerous in an open panicle; involucre 6-10 mm. high, **hairy and often also glandular; bracts well imbricate, the greenish tips often spreading and sometimes suffused with purple; rays bluish-purple, 5-12 mm. long**; achenes 3-4 mm. long, the pappus fine but stiff, unequal.



Similar Species:

1. ***Machaeranthera grindelioides*** (Nutt.) Shinners - Toothed Ironplant
   Frequent on dry eroded slopes, on alkaline clays in the prairie region. The species more closely resembles a *Haplopappus* species than *M. canescens* (and is considered by some authors to belong to the genus *Haplopappus*).
   Distinguishing features:
   - Low growing, caespitose perennials from a woody, branched caudex and heavy taproot, 1-3 dm. tall.
   - Leaves firm, grey-green, white-hairy, with spiny-toothed margins, oblong-spatulate.
   - Heads solitary-few, the involucre glandular-hairy.
   - Bracts with pointed, greenish, spreading tips.
   - Rays none.
   - Achenes pubescent, pappus tan to reddish-brown.



Habitat & Distribution:

Common in the prairie and southern parkland regions. Grows in dry, open areas, especially common on eroded banks and slopes, in badlands.

Forage Value:

Poor, the foliage of our species stiff and unattractive at all growth stages.

Grazing Response:

Increasers, but locally not considered particularly aggressive, occurrences typically sporadic; *M. grindelioides* is especially resistant to trampling, both species very tolerant of dry conditions, thus enabling them to persist when more sensitive plants suffer from drought stress.

Notes:

Syn. *Aster canescens*; the specific name, a term describing the fine, grey hairiness of the foliage; *Machaeranthera* species and their associated communities play a significant role in preventing erosion on dry, rather sparsely vegetated slopes; locally, *M. canescens* is an important and possibly exclusive host plant to the acastus checkerspot butterfly (*Charidryas acastus*).

PETASITES Mill. - Coltsfoot

Common Characteristics

- Perennial herbs from thick, long creeping rhizomes.
- Pubescence of white woolly hairs.
- Stems arising singly from rhizomes, essentially scapose but with large sheathing bracts, appearing in early spring, soon withering.
- Leaves produced late, arising directly from rhizome.
- Heads several-numerous, in corymbs or racemes, radiate or discoid, essentially dioecious: female head with mostly pistillate and fertile flowers, "male" head hermaphroditic but functionally sterile.
- Fertile plants with tubular and sometimes ligulate flowers, the substerile ones with an outer ring of pistillate rays and staminate disc flowers.
- Receptacle naked, flat.
- Styles mostly undivided, hairy.
- Achenes linear, 5-10 ribbed.
- Pappus fine, of soft white bristles.

Key to Petasites

1. Leaves arrow-shaped, entire to toothed. *P. sagittatus*

Leaves more deeply lobed. 2

2. Leaves palmately divided to near base, the lobes 5-7, elliptical, entire to toothed. *P. palmatus*

Leaves divided about 1/2 way to midrib, the lobes sometimes deeply divided. 3

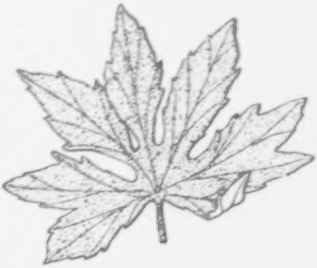
3. Blades about equal in width and length, somewhat cordate, with 3-5 lobes; edges of leaves overlapping, curved and concave; subalpine-alpine. *P. nivalis*

Blades longer than wide, distinctly cordate, with 5-7 lobes; leaf edges not overlapping, not curved and concave; of lower elevations. *P. vitifolius*

Petasites palmatus (Ait.) A. Gray - Palmate-leaved Coltsfoot

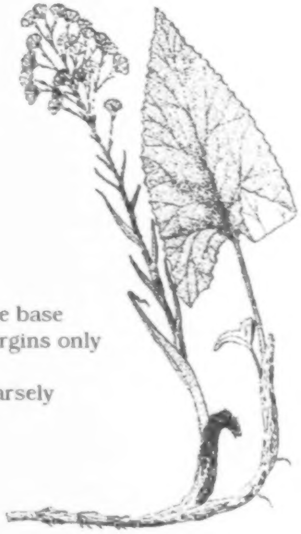
Growth Habit: Strongly rhizomatous plants; stems 1-5 dm. tall, **with narrow, parallel-veined, alternate bracts**, the largest (lowest) to 6 cm. long; stems and bracts with at least some tomentum, this sometimes present as remnant tufts.

Blades: **Leaves long petioled, 5-20 cm. wide**, glabrous to sparsely hairy and green above, **loosely white tomentose beneath; blades round-reniform in outline, deeply (to near base) divided into 5-7 elliptic lobes, these often again toothed.**



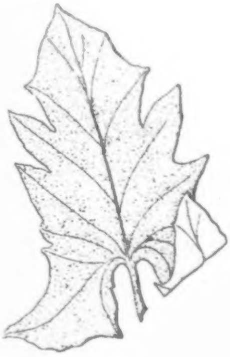
Inflorescence: Heads several-numerous in a terminal corymb/raceme; **heads (with pappus) 1-2 cm. high; rays whitish, disc white to pinkish**; achenes about 2 mm. long, glabrous, with fine, hair-like pappus.

Similar Species:

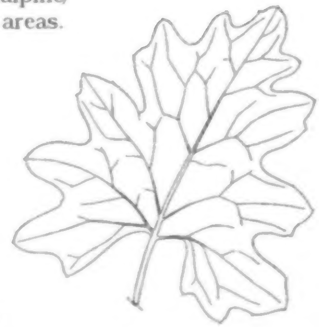


1. ***Petasites sagittatus*** (Pursh) A. Gray - Arrow-leaved Coltsfoot
   Found in much the same habitat and in the same regions. Also present in Cypress Hills. More confined to boggy and marshy sites.
   Differs as follows:
   - Leaves generally larger, to 30 cm. long.
   - Blades oblong to triangular, the base cordate-arrow-shaped, the margins only shallowly toothed.
   - Leaves more inclined to be sparsely woolly-pubescent above.
   - Heads, including pappus, larger, 2-3.5 cm. high.
   - Achenes averaging 3-3.5 mm. long.

2. ***Petasites vitifolius*** Greene - Vine-leaved Coltsfoot
   Occupying generally the same habitats, and found in the same range as *P. sagittatus* although not as common.
   Differs as follows:
   - Generally shows characteristics somewhat intermediate between *P. palmatus* and *P. sagittatus*. (Considered by some authors as a hybrid between the two species).
   - Blades more or less triangular, arrow-shaped, cordate-based, 7-15 cm. long, longer than wide.
   - Leaves toothed to about the middle, with 5-7 lobes narrowing from the base upward, their edges outward (convex) curved.



3. ***Petasites nivalis*** Greene - Coltsfoot
A Rocky Mountain species of subalpine/alpine elevations, found in moist areas. Distinguished as follows:
- Plants 1-5 dm. tall.
- Leaves shallowly cordate with 3-5 lobes, glabrous above, often somewhat woolly below.
- Leaves about as wide as long, 3-15 cm. long; leaf edges overlapping, curved/concave.
- Cauline bracts oval, inflated, sheathing stems at base.
- Heads 1-12, involucres 6-10 mm. high.



Habitat & Distribution: Most common in the foothills, montane and boreal forest regions. Absent from Cypress Hills. Upland populations reflect subhygric to mesic, sometimes poorly drained and acidic sites.

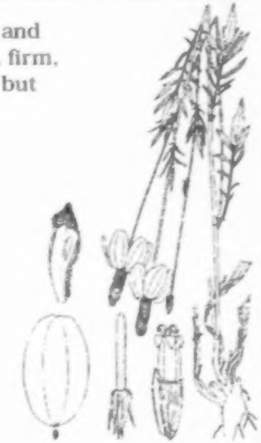
Forage Value: Poor, of little importance to grazing animals.

Grazing Response: Increasers, but confined to wet areas because of high moisture requirements.

Notes: A dozen or so species, all of these endemic to cooler zones of the northern hemisphere; from the Greek *petasos*, a broad-brimmed hat, an obvious reference to leaf shape, the various specific names also describing leaf characteristics of individual species; coltsfoot is edible, the young flower shoots and also roots once a food source of native people; medicinally, poultices can be used on sores and insect bites, the genus probably best known as a remedy for coughs and bronchial congestion, at one time used to treat ailments resulting from smoking rituals; coltsfoot tends to invade wet, disturbed soil, and has superior soil binding properties on these sites; in many cases, it will also persist and become a part of the more stable climax community; rather striking plants, often misidentified because the flower stalks arise separate from and before the leaves, these rather uniquely folded upon emergence.

RATIBIDA Raf. - Cone-flower

Ratibida columnifera (Nutt.) Wooton & Standl. - Prairie Cone-flower



Growth Habit: Perennial herbs from a thick, deep taproot and caudex, stems usually several, **3-6 dm. tall**, firm, deeply grooved, the veins pale, with sparse but **coarse, roughened hairs**.

Blades: Leaves alternate, **with 5-9 pinnate oblong-linear lobes**, these **sometimes toothed**; blades green but with **roughened hairs on both surfaces, also glandular-pitted**.

Inflorescence: Heads several, long-stalked, **radiate**; involucres mostly herbaceous, in 1 series, slender, coarse-hairy externally, reflexed; receptacle **columnar**, chaffy, the bracts with hairy tips, rays **yellow** (purple in forma *pulcherrima*), **reflexed**, few, hairy externally; **disc columnar, conspicuous**, 1.5-4 cm. long, **grey to yellowish**; achenes flat, about 2 mm. long, greyish, the inner margin slightly winged, hair-fringed along inner margin and at top; pappus **of 1-2 small teeth**; chaff clasping achenes and falling with them.

Habitat & Distribution: Common but restricted to southern regions, found in most ecoregions except the boreal forest. Grows in dry prairie grassland, sometimes in ravines and depressional areas (in driest regions), on disturbances, especially common on roadsides.

Forage Value: Poor, low in palatability and of little worth as a grazing species under normal conditions, but this and similar species reported to be used to some extent on depleted rangelands.

Grazing Response: An increaser.

Notes: Syn. *Rudbeckia columnifera*, the generic name given by Linnaeus to a father and son team, professors Rudbeck who had preceded him at the University of Uppsala; *columnifera*, referring to the cone-shaped disc; the dried disc flowers, tasting somewhat like corn, were eaten by native people, the disc and leaves also used to make tea; *Ratibida* is thought to contain substances that boost the immune system, its attributes similar to but probably less potent than those of *Echinacea* which is still used as a herbal remedy; as well, a yellow-orange dye was obtained from the roots; cone-flower, especially forms with purple or orange-tinged rays, has considerable ornamental value, and is also a natural reclamation species, moving readily onto disturbances, especially common along roads and trails; plants are fairly easy to establish from seed, also can be successfully transplanted.

SENECIO L. - Groundsel; Ragwort

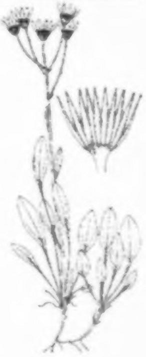
Common Characteristics

- Annual to perennial herbs, roots various.
- Leaves alternate and basal, entire to variously divided.
- Heads mostly radiate, occasionally discoid.
- Involucres herbaceous, in 1 row, the principal bracts narrow, erect, converging toward the tips; a few much smaller bracts often present at base.
- Rays yellow-orange, pistillate and fertile.
- Disc mostly yellow, also pistillate and fertile.
- Achenes nearly rounded, slender, 5-10 ribbed.
- Pappus fine, hair-like, mostly white, of soft bristles.

Key To Senecio

1.	Marsh plants, annual, foliage densely villose-hairy.	*S. congestus*
	Perennials, not as above.	2
2.	At least some involucre bracts black-tipped.	3
	Bracts not black-tipped.	7
3.	Blades not much reduced upward.	4
	Blades reduced upwards.	5
4.	Leaves triangular, sharply toothed.	*S. triangularis*
	Leaves more elongate, more deeply lobed.	*S. eremophilus*
5.	Plants essentially glabrous at maturity.	*S. foetidus*
	Plants with some hairs at maturity.	6
6.	Plants from a short caudex; lowest leaves lanceolate to ovate, with evident petioles.	*S. integerrimus*
	Plants from elongated rhizomes; lower leaves linear to lanceolate, without evident petioles.	*S. lugens*
7.	Blades not much reduced upward.	8
	Blades reduced upward.	9
8.	Leaves triangular, sharply toothed.	*S. triangularis*
	Leaves more elongate, more deeply lobed.	*S. eremophilus*
9.	Plants grey-green; basal blades entire to obscurely toothed; plants of dry habitats.	*S. canus*
	Plants deeper green; leaves conspicuously toothed.	10
10.	Blades thin, elliptic-oblanceolate, toothed on margins and apex; apex obtuse-rounded.	*S. pauperculus*
	Blades firm, elliptic-rounded, the apex truncate and 2-3 toothed.	*S. streptanthifolius*

Senecio canus Hook. - Prairie Groundsel

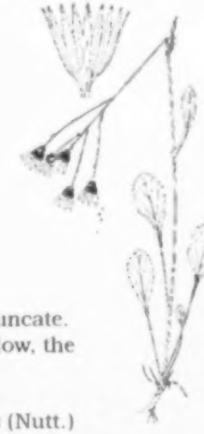


Growth Habit: Perennials from branched, somewhat rhizomatous caudex, also sometimes forming taproots; stems 1-several, **1-4 dm. tall, white-hairy, usually densely so.**

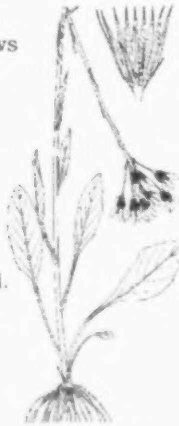
Blades: **Basal blades well developed**, tufted, 1-6 cm. long, **oblanceolate-oval/ovate**, short stalked, **entire to toothed**; cauline **much smaller upward**, stalkless and **with basal auricles**, toothed; blades **densely white hairy, grey-green**, sometimes thinly hairy above.

Inflorescence: Heads **several**, the involucres 4-8 mm. high, **thinly-moderately hairy**; involucre bracts **in 1 row, mostly equal** except a few outer short bracts; rays 6-13 mm. long, **bright yellow**; achenes slender, pappus **white; fine, hair-like**.

Similar Species:

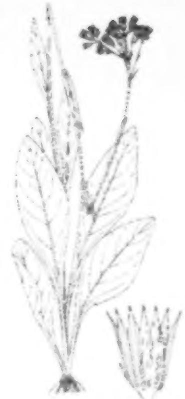


1. ***Senecio streptanthifolius*** Greene - Ragwort
   Found on open, often rocky flats, in rather dry, open woods. Frequent in western areas, in the northern boreal forest, and in a few scattered localities in the northern parkland. Grows from low to moderate elevations.
   Differs as follows:
   - Blades thick and somewhat fleshy, greenish.
   - Blades obovate-spatulate, the apex truncate.
   - Blades entire to obscurely toothed below, the apex distinctly several-toothed.

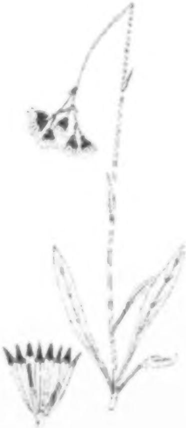


2. ***Senecio integerrimus*** Nutt. var. ***exaltatus*** (Nutt.) Cronq. - Entire-leaved Groundsel
   Frequent in the foothills and montane region, occasional in the parkland and prairies. Grows in moist grassland, in open woods, on lush coulee slopes.
   Distinguishing features:
   - Tall plants, 2-7 dm. tall.
   - Plants with at least some cobwebby hairs, at least in leaf axils.
   - Lowest blades stalked, oval to oblong, often toothed, large (6-25 cm. long).
   - Stem leaves smaller, more deeply toothed.
   - Heads often numerous, the terminal head on a shortened, stout stalk.
   - Bracts black-tipped (sometimes obscurely so).
   - Rays 6-15 mm. long.

3. ***Senecio foetidus*** Howell var. ***hydrophiloides*** (Rydb.) Barkley - Marsh Butterweed
Restricted to the southern foothills region, also in Cypress Hills. Grows in moist, lush meadows in foothills and montane areas.
Differs from *S. integerrimus*:
    - Plants usually totally hairless at maturity.
    - Leaves thicker, often somewhat succulent.
    - Rays fewer (often 5) and averaging shorter, up to 8 mm. long.



4. ***Senecio lugens*** Richards. - Ragwort
More restricted in its range, common in the upper foothills and Rocky Mountain region, in alpine habitats, and also in northern regions. Found in moist and boggy woods. Associated with poorly drained, somewhat acidic sites.
Differs from *S. integerrimus*:
    - Plants from short, thick rhizomes.
    - Stems averaging somewhat shorter, 1-5 (6) dm. tall.
    - Lower leaves narrower-oblong/oblanceolate and narrowed at the base to short broad winged petioles.
    - Heads fewer (5-15).
    - Bracts more conspicuously black-tipped, tips often longer than 1 mm.
    - Small outer bracteoles also much more conspicuously black-tipped.



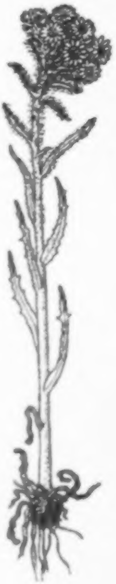
Habitat & Distribution: Common in all ecoregions except the boreal forest. A species of dry habitats, both at montane to alpine elevations, and across the prairies: found on open rocky hillsides, exposed and eroded slopes, in dry grassland.

Forage Value: Poor to fair for the genus as a whole, the smaller species with stiff, hairy foliage (*S. canus*) the least palatable, sometimes grazed by sheep, less often by cattle; others, with smooth leaves and occupying moist habitats, are eaten quite readily by livestock and game, especially early in the season, the larger species providing considerable amounts of forage; *S. integerrimus* has been identified as containing toxic alkaloids responsible for liver damage, although the species contains much lower concentrations of poison than several other ragworts (these, fortunately, native only further south).

Grazing Response: Increasers; *S. canus* is our least palatable ragwort, spreading readily when better forage is grazed out, other species found in moist habitats fairly resistant to heavy utilization, thus usually also increasing to some extent.

Notes: *Senecio*, from *senex*, an old man, the receptacle, like an elderly bald man, without bristles; *canus* means white-grey, referring to the foliage; *S. canus*, in particular, functions in stabilizing soils on steep erodable slopes and on shallow, rocky sites; other *Senecio* species occupying moist habitats, although to a lesser degree, provide cover and bind disturbed, wet soil.

Senecio congestus (R. Br.) DC. - Marsh Ragwort



Growth Habit: **Fibrous-rooted annual or biennial; stems hollow, stout, ridged, 2-8 dm. tall, moderately hairy, sometimes sparsely so with remnant tufts at maturity.**

Blades: Leaves basal and cauline, **the lower lanceolate-spatulate and wing-stalked, 5-15 cm. long, the margins wavy to shallowly toothed**; upper leaves similar but becoming smaller, sessile, clasping; **blades hairy or becoming subglabrous at maturity, with some persistent tufts, especially on midribs below**.

Inflorescence: Heads several-many in a rather dense or open cluster; involucres about 8 mm. high, the bracts and peduncles pubescent; **rays present, pale yellow, short; pappus conspicuous**.

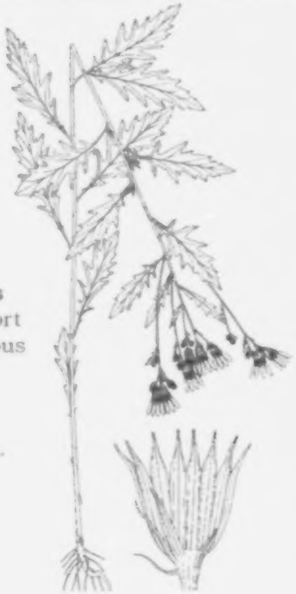
Habitat & Distribution: Frequent in the parkland and boreal forest regions. A wetland species, often in shallow water; grows around lakes and sloughs, in marshes, in wet ditches, along streams. Somewhat weedy, frequently forming a solid stand along shorelines.

Forage Value: Poor, of no value as a forage species.

Grazing Response: An increaser, aggressive on disturbed soil around sloughs and marshes, and although very site specific, is considered weedy in these habitats, out-competing more desirable species for space and moisture.

Notes: *Congestus*, in Latin, means mass, heap, accumulating, perhaps a reference to the congested flowers or the extensive and often exclusive populations that invade wetlands.

Senecio eremophilus Richards. - Cut-leaved Ragwort



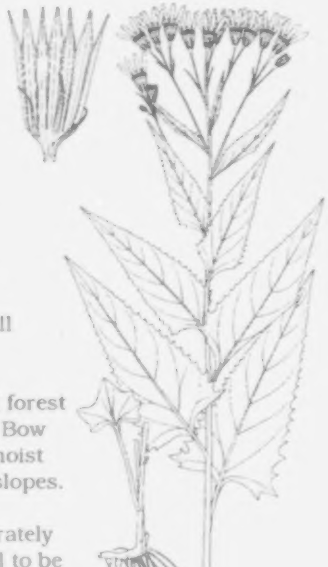
Growth Habit: Short-lived perennial from a taproot; stems mostly solitary, **5-10 dm. tall, stout**, ridged, purple-tinged, mostly glabrous.

Blades: Blades of lower stems smaller and often early deciduous, **those of mid and upper stems numerous and well developed**, only reduced in inflorescence; **blades 1-2 dm. long, laciniately lobed or pinnatifid, the lobes again sharply toothed**; lower blades short stalked, the upper sessile; leaves glabrous to sparsely pubescent.

Inflorescence: **Heads usually numerous** in large corymbose clusters; involucres 6-8 mm. high, green with pale margins, **sometimes black-tipped**; rays about 8, 6-10 mm. long.

Similar Species:

1. *Senecio triangularis* Hook. - Brook Ragwort
   Frequent in the foothills/ Rocky Mountain regions, also at higher elevations in the boreal forest. Found in moist, rich wooded areas. Differs as follows:
   - Cauline blades also well developed and numerous, those at mid-stem largest, blades triangular-lanceolate, sharply toothed.
   - Blades thin and shining.
   - Bracts similar but with small tufts of hairs at the tips.



Habitat & Distribution: Frequent in the parkland and boreal forest regions. Also a population along the Bow River in western Alberta. Found in moist thickets and open woods, on moist slopes.

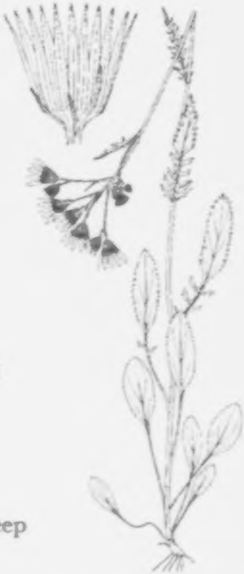
Forage Value: Fair, *S. eremophilus* rating as moderately palatable, *S. triangularis* considered to be one of our most attractive ragworts, consumed readily by all ungulates but especially so by sheep and game; when abundant, it can furnish appreciable amounts of forage.

Grazing Response: An increaser (*S. eremophilus*), *S. triangularis* a decreaser when in primary grazing range, in these cases grazed to an extent that populations often decline; adding to its demise is its reputed low seed viability, and, as a consequence, reproductive limitations even in optimum conditions.

Notes: Two of our more impressive ragworts, their natural beauty enhanced by the lush habitats they occupy.

Senecio pauperculus Michx. - Balsam Groundsel

Growth Habit: Fibrous rooted perennial from a short, simple to branched caudex; plants somewhat stoloniferous; **stems slender, 1-6 dm. tall, mostly glabrous at maturity, usually with some tomentose tufts remaining.**



Blades: **Basal blades oblanceolate-elliptic or spatulate**, with slender petioles, **subentire to crenate-serrate**, the bases tapering-cuneate, **the apex rounded; cauline blades narrower and more deeply pinnatifid, greatly reduced upward; blades thin, not succulent**, nearly glabrous at maturity but often with remnant tufts of tomentum, especially in axils.

Inflorescence: Heads several, on long slender pedicels; **involucres 6-9 mm. high, mostly green, sometimes obscurely purple-tipped; rays deep yellow, well developed, 5-10 mm. long.**

Habitat & Distribution: Common in all ecoregions except the prairies. Grows in moist places: in moist meadows, in swampy or boggy places, in wet woods, on shores, on wet ledges and banks, sometimes in saline or calcareous soils.

Forage Value: Fair, *S. pauperculus* moderately palatable, and although not a large leafy species, is common and sometimes abundant, and in these cases can produce some quantities of forage.

Grazing Response: Increasers.

Notes: *Pauperculus* translates poor, or poverty, the specific meaning unclear; ragworts are of some importance as ground cover, *S. pauperculus* especially so because of its widespread occurrences and adaptations. *Note:* Also similarly distributed in moist areas is *S. indecorus* Greene, vegetatively similar except lower leaves broader-ovate, and bract tips purplish, rays absent.

SOLIDAGO L. - Goldenrod

Common Characteristics

- Perennials with fibrous roots, either from a caudex or rhizome.
- Blades both basal and cauline (alternate and stalkless), entire to toothed.
- Inflorescence of mostly numerous, relatively small radiate heads.
- Involucres 3-6 mm. high, green at the tips, overlapping, in several series.
- Receptacle small, flattish, naked.
- Rays short, yellow.
- Disc flowers yellow.
- Achenes nearly rounded, several nerved.
- Pappus of equal whitish, fine, hair-like bristles.
- Flowering in mid-late summer.

Key to Solidago

1. Leaves mostly glabrous except for conspicuously ciliate petioles; small plants, mostly less than 3(4) dm. tall; Rocky Mountain/northern species. *S. multiradiata*

Pubescence not as above; plants mostly taller. 2

2. Heads in a rounded flat-topped inflorescence, of corymbs. 3

Inflorescence not flat-topped, of racemes. 4

3. Plants glabrous, leaves narrow; involucres sticky-glutinous, to 5 mm. high; leaves pitted. *S. graminifolia*

Plants grey-hairy, leaves broad; involucres striate, not glutinous, 5-7 mm. high. *S. rigida*

4. Leaves and stems hairy. 5

Leaves and stems (at least above) glabrous. 6

5. Leaves stiff, elliptic-obovate, grey-velvety-hairy; plants to 4 dm. tall. *S. mollis*

Leaves not firm or stiff, green, lanceolate, toothed; plants 4-12 dm. tall. *S. canadensis*

6. Leaves 1-nerved, spatulate-oblanceolate; inflorescence narrow; involucres glutinous, 4-6 mm. high. *S. spathulata*

Plants not as above; involucres 3-5 mm. high. 7

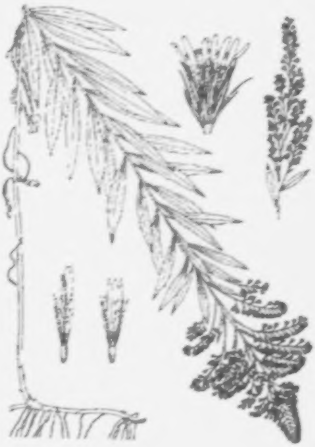
7. Leaves often in a basal rosette, the lower well developed, 3-nerved, reduced upward; plants 2-4 dm. tall. *S. missouriensis*

Leaves not in basal rosettes, the cauline well developed and little reduced; plants 5-15 dm. tall. *S. gigantea*

Solidago canadensis L. var. ***canadensis*** - Graceful Goldenrod; Canada Goldenrod

Growth Habit: Plants **from creeping rhizomes, often forming large patches**; stems **stout, 3-12 dm.** tall, **finely but roughly hairy**, at least on the upper half.

Blades: Blades **mostly cauline** (lower early withering), **numerous, crowded, scarcely reduced, tri-nerved, lanceolate**, long-pointed, **toothed, 4-10 (12) cm. long**; blades green, **finely rough-coarse-hairy on both surfaces or hairless above.**

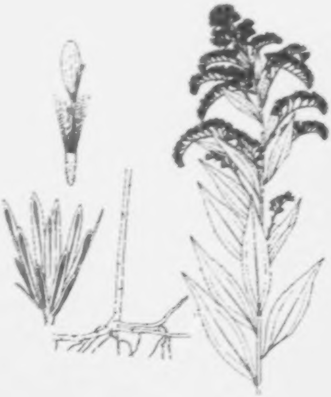


Inflorescence: Inflorescence a terminal panicle, the branches rather narrow to open-pyramidal, often one-sided, finely rough-hairy; involucres **2-4 mm. high**, the bracts thin, overlapping, linear-lanceolate, long-pointed, finely rough-hairy; rays and disc **yellow**, the **rays 1-3 mm. long**, achenes hairy; pappus of white, fine, hair-like bristles.

Related Species:

1. Var. ***gilvocanescens*** Rydb.
   - Plants shorter, 25-60 cm. tall.
   - Blades more uniformly hairy above and below.
   - Blades somewhat smaller (2-5 cm. long) and often less evidently toothed.

2. ***Solidago gigantea*** Ait. var. ***serotina*** (Ait.) Cronq. - Late Goldenrod
   Also throughout most regions, but generally less common. Found in much the same habitats as *S. canadensis*.
   Differs as follows:
   - Stems hairless, sometimes glaucous, branches finely roughened-hairy.
   - Blades hairless, sometimes sparsely hairy on veins below.
   - Bracts slightly firmer and pointed.



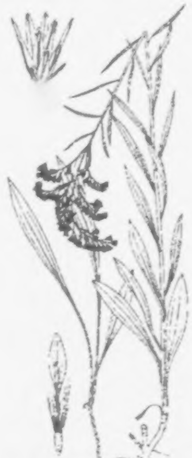
Habitat & Distribution: Common, found throughout most ecoregions. Grows in clearings and open woods, in thickets, along wooded roadsides, in moist meadows and lush grassland. Restricted to moister sites (coulee slopes, snow melt areas) and better soils in driest regions.

Forage Value: Poor; although the larger goldenrods produce fair quantities of forage, they are grazed only sparingly, usually late in the season if upland forage becomes scarce or dry during hot weather.

Grazing Response: An increaser, capable of spreading readily by means of vigorous rhizome growth.

Notes: From the Latin *Solidus*, whole, and *ago*, to make, in reference to their supposed healing properties, *canadensis*, for its Canadian distribution; the genus was rather well known to aboriginal people, young foliage eaten as a herb, and tea made from dried leaves and flowers; medicinal uses were varied, infusions used to treat weak bowels and bladders, to relieve colic, and to dissolve kidney stones; anticeptic lotions were made from the foliage, poultices used on sore throats, and tea washes applied for rheumatism and headaches; tea made from roots was used for colds, and pieces of root were applied to relieve toothaches; as well, the flowers can be used to produce yellow-tan and golden dyes; because of its strongly rhizomatous nature, *S. canadensis* (also *S. gigantea*, although its competitive ability appears somewhat inferior) is recommended for revegetating disturbances on sites with good soil and moisture conditions in the prairies, and throughout most other regions.

Solidago missouriensis Nutt. - Low Goldenrod



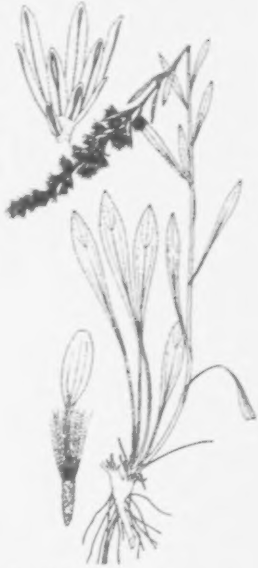
Growth Habit: Perennials **from extensive rhizomes**, sometimes also with a well developed caudex; stems **1-4 (6) dm. tall**, arising singly or sometimes several together; stems **mostly hairless**, sometimes finely hairy.

Blades: **Basal and lowest cauline leaves well developed, oblanceolate, to 10 cm. long**, stalked, **3-nerved, entire to obscurely toothed**; middle and upper cauline blades narrower, stalkless, **much smaller**; leaves hairless except for a few stiff, roughened marginal hairs.

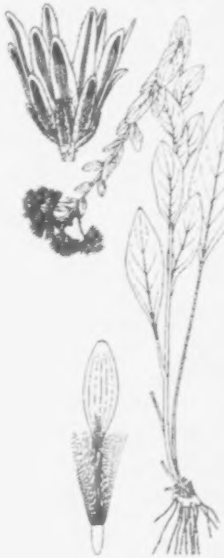
Inflorescence: Heads numerous in an **open, usually one-sided panicle, this rounded to flat-topped**; panicle branches often sparsely hairy; involucres **3-5 mm. high**, the bracts overlapping, linear-oblong, **blunt to acutish**, the margins sparsely roughened-hair-fringed; rays and disc **yellow**, achenes hairless or sparsely hairy; pappus of white fine, hair-like bristles.

Similar Species:

1. ***Solidago spathulata*** DC. - Mountain Goldenrod
Frequent throughout most regions, occasional on better sites in the prairies. Grows in open woods and grassland, on rocky montane slopes, in sandy places.
Differs as follows:
   - Blades broader and rounded (spatula-shaped) at the top, shallowly toothed above the middle.
   - Blades 1-nerved.
   - Heads in a long, narrow raceme, this not one-sided.
   - Involucres slightly larger (4-6 mm.), somewhat shiny-glutinous.
   - Bracts oblong, blunt, yellowish.



2. ***Solidago rigida*** L. var. ***humilis*** Porter -Stiff Goldenrod
Common in the parkland, occasional in the foothills and prairie regions. Grows in grassland, open woods, in sandy places.
Distinguished as follows:
   - Non-rhizomatous plants 2.5-5(8) dm. tall.
   - Plants grey-green with short velvety hairs, stem hairs soft, those of leaves stiffer but not rough.
   - Lowest blades largest, 5-15 cm. long, oval-oblong, rounded to pointed, often slightly toothed; heads in compact flat-topped corymbs, relatively large (involucres 5-7 mm. high, rays 2.5-5 mm. long), disc to 10 mm. wide.
   - Bracts firm, oblong, strongly nerved.



3. ***Solidago mollis*** Bartl. - Velvety Goldenrod
Frequent in southern regions. Grows in dry prairie grassland, in sandy grassland, in ditches and along roads.
Differs from *S. rigida* as follows:
   - Plants distinctly rhizomatous, caudex not well developed.
   - Lower leaves short-petioled (lowest cauline early deciduous).
   - Leaves and stems velvety-pubescent and rough, the leaves especially scabrous, the tips apiculate-pointed.
   - Lower leaves often toothed, distinctly 3-nerved.
   - Cauline leaves progressively reduced, but numerous, often overlapping, obscuring the stem.
   - Heads small, involucres to 5(6) mm. high, the bracts not streaked, obtuse-acutish, yellowish; rays to 4 mm. long.
   - Inflorescence a cylindrical-ovoid panicle, usually with numerous heads.

4. ***Solidago graminifolia*** (L.) Salisb. var. ***major*** (Michx.) Fern. - Flat-topped Goldenrod
Widely distributed throughout the area, found in moist places. Especially common along rivers and streams. Also a flat-topped species, but otherwise not similar to *S. rigida*.
Distinguishing features:
   - Plants glabrous.
   - Blades narrow (linear to lanceolate), entire.
   - Blades 3 (5)-nerved, punctate.
   - Involucres smaller (3-5 mm. high), glutinous, yellowish.

Habitat & Distribution:

Common in all regions except the boreal forest. Grows in dry, mostly open places: in open woods, in dry prairie grassland, in foothills grassland, in sandy soil, along roadsides and in other disturbed areas.

Forage Value:

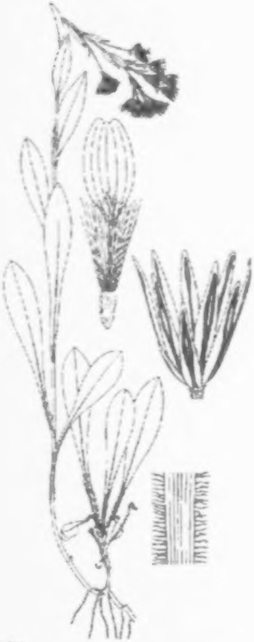
Poor; goldenrods of drier habitats and those with stiff, hairy foliage the least palatable species and essentially worthless as range plants.

Grazing Response:

Increasers, rhizomatous species the most aggressive and persistent.

Notes: Goldenrods have considerable ornamental potential, also establish well on natural disturbances; the different species are variously adapted, *S. mollis* the most restricted in its range, *S. rigida* best suited to fescue grasslands and better sites in the prairie region, and both *S. spathulata* and *S. missouriensis* exceptionally adapted to a wide range of soil and moisture conditions; *S. missouriensis*, the most aggressive, is valued as an early successional species throughout its range.

Solidago multiradiata Ait. - Alpine Goldenrod



Growth Habit: Perennials from short rhizomes or sometimes a branching caudex; stems usually somewhat tufted, **0.5-4 dm. tall**, often reddish-tinged, villose, especially above.

Blades: **Basal and lowest cauline leaves largest, oblanceolate, 2-10 cm. long, usually toothed, especially toward apex**; upper leaves reduced, becoming sessile, narrower; leaves mostly glabrous except for a **conspicuous white hair fringe on petioles and lower margins.**

Inflorescence: Heads in a loose and compact corymb-like inflorescence, the peduncles mostly elongate, white-pubescent; pedicels white-pubescent; **involucres relatively large, 4-6 mm. high, the bracts linear-lanceolate, acute-acuminate**, often not strongly imbricate, sparsely pubescent, **with ciliate margins; rays relatively long, yellow, 4-5.5 mm. long**; achenes pubescent.

Habitat & Distribution: Very common in the foothills/Rocky Mountain regions, also in the northern boreal forest. Grows in open woods, in foothills and montane meadows, on rocky slopes.

Forage Value: Poor, one of our more palatable species, but still rather sparingly used except when alternative forage is scarce.

Grazing Response: An increaser, although not strongly rhizomatous and thus not overly aggressive and rarely very abundant.

Notes: A small but impressive species, *S. multiradiata* is suitable for use in cool, shaded rock gardens where it is less likely to take over than its larger relatives.

SONCHUS L. - Sow Thistle

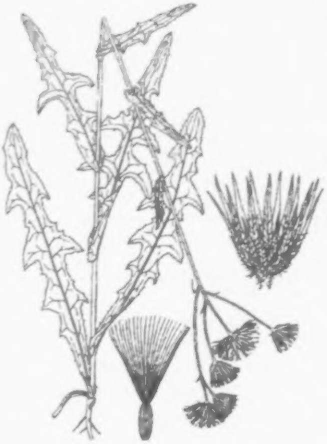
Common Characteristics

- Annual to perennial herbs with milky juice.
- Blades alternate, often clasping, entire to toothed, often spiny-margined.
- Heads 1-many, in corymbs.
- Flowers all ligulate, perfect, yellow.
- Bracts in several series, the bases often thickening.
- Achenes flattened, ribbed, hairless, beakless.
- Pappus of numerous white fine, hair-like bristles.

Key to Sonchus

1.	Peduncles and involucres glabrous or nearly so.	*P. uliginosus*
	Peduncles and involucres with coarse gland-tipped hairs.	*S. arvensis*

Sonchus arvensis L. - Perennial Sow Thistle



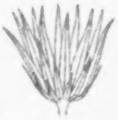
Growth Habit: Perennials **with milky juice**, spreading **from long, deep rhizomes**; stems **mostly hairless, 4-20 dm. tall**.

Blades: Leaves alternate, **to 4 dm. long, pinnately-lobed**, the **margins spiny**; blades **with basal auricles**, the upper clasping and less deeply lobed.

Inflorescence: Heads several, in open corymbs, the **involucre and flower stalks with coarse gland-tipped hairs**; bracts **in several series**, the **bases thickening**, the involucres to **25 mm. high at maturity**, hemispherical to cup-shaped; flowers **yellow, all ligulate**; achenes **flattened, ribbed**; pappus **fine, hair-like, white**.

Similar Species:

1. ***Sonchus uliginosus*** Bieb. - Smooth Perennial Sow Thistle
Also introduced and becoming common, found in similar habitats.
Differs as follows:
    - Plants somewhat taller growing.
    - Blades usually less deeply lobed.
    - Gland-tipped hairs on flower stalks and involucres lacking (sometimes a few stalkless glands present).
    - Involucres somewhat narrower and paler, the bracts distinctly white-margined, the outer with keeled margins.



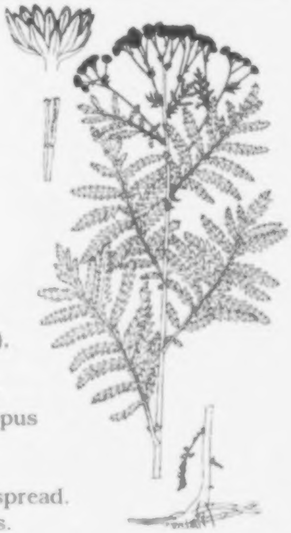
Habitat & Distribution:	Introduced, common in moister regions. Found in waste places, along roads and trails. Designated as a noxious weed in Alberta.
Forage Value:	Fair, grazed quite readily, especially the young foliage, often supplying considerable amounts of forage before the majority of range species begin growth.
Grazing Response:	An invader, introduced from Europe, and along with the similar *S. uliginosus*, is very common, restricted to depressional locations in the prairie region; the very aggressive rhizomes are deep-seated, often below the normal depth of cultivation; as well, seeds are produced in abundance, are readily dispersed by wind and water, and remain viable for some time in the soil; in some areas, large infestations of both species are moving from disturbed sites onto native rangeland.
Notes:	*Sonchus*, from *somphos*, spongy, describing the spongy latex-filled stems, *arvensis* meaning field; the common name, apparently because they are a favorite food of pigs; sow thistles are rather effective in binding loose disturbed soil, but despite this or any other positive attributes the genus may have, its very aggressive, weedy nature necessitates eradication whenever possible.

TANACETUM L. - Tansy

Common Characteristics

- Mostly rhizomatous plants.
- Blades alternate, pitted to villose, 1-3 times pinnately dissected.
- Heads in corymb-like clusters.
- Heads essentially discoid (outer flowers often ray-like), many-flowered.
- Involucre bracts imbricate, dry, the tips and margins pale (scarious).
- Receptacle convex to flat, naked.
- Marginal flowers more or less radiate, pistillate, sometimes lacking.
- Disc flowers perfect, yellow.
- Achenes angled or ribbed, usually glandular.
- Pappus a short crown or none.

Tanacetum vulgare L. - Common Tansy



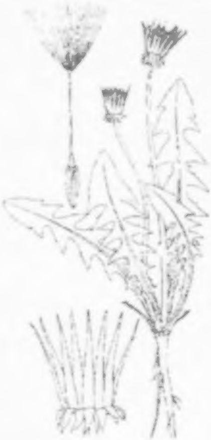
Growth Habit:	Coarse **aromatic** perennials **from stout rhizomes**; stems erect, 4-18 dm. tall, **glabrous**, ribbed.
Blades:	Leaves numerous, **1-2 dm. long**, short stalked to sessile, **glabrous**, **pitted**, **pinnate** and again deeply **cleft into fern-like segments**; rachis winged.
Inflorescence:	Heads **numerous** (20-200) **in a flat-topped corymb**, the discs **0.5-1 cm. wide**; heads **essentially discoid** (sometimes with a few short, outer rays), **yellow**; bracts imbricate, the tips and margins **dry-scarious**; receptacle nearly flat, naked; achenes angled, ribbed, pappus a minute crown or lacking.
Habitat & Distribution:	Introduced and now common and widespread. Grows in disturbed places, on roadsides.
Forage Value:	Poor, rarely grazed by livestock, also poisonous, known to cause abortions and occasionally death in overgrazed pastures where the species has invaded.
Grazing Response:	An invader, European in origin, most troublesome in disturbed places and along roads; as an agricultural weed, tansy is a concern in overgrazed pastures and forage crops that are infrequently cultivated; once established, it can be difficult to eradicate.
Notes:	The generic *Tanacetum* is an apparent corruption of the Latin *athanasia*, undying, this either derived from some medieval medicinal application, or a reference to the extended flowering period; tansy is an escape from both herbal and ornamental gardens, extracts of the species a well known cure for intestinal parasites, but also can cause abortions, and in some cases, has been linked to fatalities; with the increasing popularity of natural and alternative medicine has come the widespread use of a related species (*Tanacet*) in the treatment of migraines; in some cases (when the migraine is not eye-related (Irlen Syndrome)), the effects are rather long-lasting and use of the herb can be discontinued for some time.

TARAXACUM Weber - Dandelion

Common Characteristics

- Perennials from rather fleshy taproots.
- Stemless plants with milky juice.
- Leaves basal, entire to pinnately toothed.
- Heads solitary, on elongate hollow leafless stalks.
- Receptacle naked.
- Involucres leafy, bracts in 2 unequal series, the inner elongate, sometimes horned, the outer short, often reflexed.
- Flowers yellow, all ligulate, perfect.
- Achenes elongate, rounded, longitudinally ribbed, roughened, at least above, tapering into a long apical beak.
- Pappus of numerous, non-feathery, white to brown, fine, hair-like bristles.

Taraxacum officinale Weber - Common Dandelion



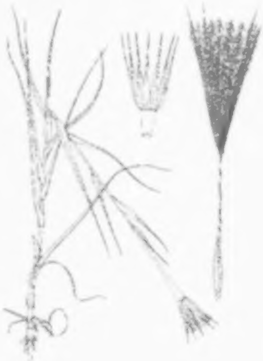
Growth Habit: Stout perennials from **deep, fleshy taproots**; flower stalks hairless to sparsely long-hairy, at least above, 0.5-4 dm. tall; juice milky.

Blades: Leaves **large**, 6-40 cm. long, **oblanceolate in outline, lobed, divided about 1/2 way to midrib into broad, triangular, toothed lobes**, the terminal lobe larger than lateral lobes; blades mostly hairless or with sparse hairs below, especially on midrib; stalks narrowly winged.

Inflorescence: Heads **solitary**, usually **large**, the involucres 1.5-2.5 cm. high; inner bracts slightly horned, the outer reflexed; flowers **all ligulate, yellow**; achenes with bodies 3-4 mm. long, the **beak 2-4 times this length**, greyish-green; achenes 4-5 nerved, **roughened above** and sometimes below the middle; pappus white, **fine, hair-like**.

Similar Species:

1. ***Tragopogon dubius*** Scop. - Goat's-beard
   An introduced species, often found on disturbed sites, but also sometimes persisting in prairie grassland, where it is an indication of heavy grazing.
   Differs as follows:
   - Stem leaves present, linear, mostly entire.
   - Bracts in 1 row, mostly 13 per head.
   - Pappus bristles feathery, of interwebbed branches.



Habitat & Distribution:	Introduced, and now very common. Found in all better soil and moisture zones in waste and disturbed places and in altered rangeland.
Forage Value:	Fair, palatable to all classes of livestock, especially so to sheep, and providing an abundance of forage; plants green-up early in the spring and maintain succulent and nutritious growth throughout the season if moisture conditions remain favorable.
Grazing Response:	An invader, of European origin, usually an indicator of overgrazing, very common in abused and altered rangeland; dandelion is one of the most widespread weeds in the world, rather remarkably adapted to extremes in growing conditions; the exceptional success of the species can be attributed to its vigorous growth from deep fleshy taproots, and production of large amounts of viable, easily dispersed seed; under heavy grazing pressure, the leaves form flat rosettes which protects them from close clipping; as well, the species readily produces new foliage when grazed off, and can continue to flower from early spring until fall. *Note:* Goat's-beard is much less aggressive but nevertheless an increaser, especially common on rangelands in the prairie region that have seen long-term heavy use, also on abandoned cultivation that has more or less returned to a native state.
Notes:	*Taraxacum*, of uncertain origin, perhaps from the Greek *tarassein*, to stir up, a reference to medicinal properties; the word dandelion, a corruption of the French dent-de-lion, tooth-of-a-lion, alluding to the incised leaves; dandelion greens, extremely high in vitamins A, B and C, are widely used as a salad green, also cooked, and the roots sliced and cooked, or roasted and ground as a coffee substitute; medicinal uses of the species are as varied as the habitats occupied, the roots containing natural salts, useful as a diuretic, mild laxative, to purify blood, and with an antimicrobial effect; plants are also reported as useful against breast cancer, to lower cholesterol, high blood pressure, and effective in treating emotional problems and PMS.

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Glossary

abaxial:	On the side away from the axis.
achene:	A small dry, indehiscent, 1-seeded fruit with a thin wall.
acuminate:	Gradually tapered to a long, slender point.
adaxial:	Turned toward the axis.
adenate:	An organ totally united to another (without joints).
alternate:	Situated singly (not opposite) on a stem, or placed regularly between organs of another kind (stamens alternate with sepals).
ament:	A dense spike or raceme with small, naked or apetalous, mostly unisexual flowers; catkin.
androecium:	Stamens considered collectively.
angiosperm:	Flowering plants (*Magnoliophyta*), containing ovules enclosed in an ovary.
anther:	Pollen-bearing part of a stamen, usually consisting of 2 pollen sacs and connecting tissue.
anthesis:	The time of full flower expansion and functioning of reproductive structures.
apetalous:	Lacking petals.
aphyllopodic:	Lowest leaves reduced, scale-like, the first true blades appearing well above the plant base.
appressed:	Lying flat against another organ.
aquatic:	Living in water.
areolae:	Small, defined areas on a surface.
articulate:	Jointed, the joint the point of ultimate separation.
ascending:	Sloping upward at an oblique angle.
auricles:	Small, ear-shaped appendages such as those at the base of a leaf.
awl-shaped:	Gradually tapering from the base to a slender rigid point.
awn:	A bristle-like, usually terminal appendage.
axil:	The upper angle formed by a leaf or petiole with the stem.
axillary:	Situated in or arising from an axil.
banner:	The upper, usually enlarged petal in a papilionaceous flower.
barbed:	Having short, stiff, pointed, bristly, often reflexed hairs.
basal:	Located at the base of an organ or plant.
beak:	An elongated, usually slender tip on organs such as fruits or seeds; not applied to flat organs (leaves).
berry:	A fleshy or pulpy fruit formed from a single pistil, having 1-many seeds, a fleshy ovary wall and a thin outer skin.

biennial:	Plants completing their life cycle in two years, usually only flowering in the second year.
bidentate:	Cleft so that two teeth result.
bilabiate:	Two-lipped (applied to perianth segments).
blade:	The flat, expanded part of a leaf or petal.
bract:	A reduced/modified scale or leaf subtending a flower or flower cluster.
bractlet, bracteole:	A very small bract; bracts borne on a petiole instead of subtending it.
bud:	An undeveloped flower, leaf or stem, vegetative buds usually covered by small modified leaves (bud scales).
bulb:	A short, thick underground bulb covered by fleshy modified leaves or leaf bases functioning as food storage organs.
bulblet:	A small new bulb arising beside a parent bulb; also refers to structures produced by some plants in axils, sometimes replacing flowers, functioning as a vegetative reproductive structure.
caespitose:	Densely tufted plants.
calcareous:	Lime-rich (calcium carbonate).
callus:	A firm thickening, as on the base of lemmas in grasses.
calyculate:	Having a set of small bracts around the calyx, or in *Compositae*, around the involucre, giving the appearance of an outer calyx.
calyx:	Referring to the sepals collectively.
capillary:	Fine and hair-like.
capsule:	A dry, dehiscent fruit composed of more than 1 carpel (compound ovary).
carinate:	Keeled.
carpel:	The fertile unit of an angiosperm having stigma, style and ovary. Pistils are composed of 1-several carpels.
caryopsis:	The fruit of grasses, with the pericarp adnate to the seed (unlike achenes).
catkin:	See ament.
caudex:	A short, vertical, thick and sometimes woody stem base of perennial herbs, at or just below soil surface. Produces new annual growth, and can surmount a taproot or rhizome.
caulescent:	Leafy stems, with evident internodes.
cauline:	Situated on or pertaining to a stem.
chaff:	Thin, dry scales, as in bracts in composite flowers.
ciliate:	With a fringe of marginal hairs.
clasping (leaves):	The base partially or completely surrounding the stem.
claw:	Narrowed, stalk-like base of a petal or sepal.
cleft:	Divided to about the middle ("lobed" meaning more shallowly divided, "parted" more so).

cleistogamous (flower):	Setting seed without opening.
climax plants:	The original, stable vegetative community that develops throughout time on a specific soil and specific climate.
collar:	The band at the outer side of a grass leaf at the junction of sheath and blade.
colonial:	Plants forming colonies, connected underground by rhizomes.
complete (flowers):	Having calyx, corolla, and functional male and female organs (androecium and gynoecium).
compound leaf:	Composed of two or more distinct leaflets.
cone:	Sporophylls or ovuliferous scales clustered on an axis.
conical:	Cone-shaped.
connate:	Grown together or attached.
connective:	The tissue connecting two pollen sacs of an anther.
connivent:	Converging, but organs not actually united.
continuous (collar):	Extending from one sheath margin to the other.
cordate:	Heart-shaped, the apex pointed, the base rounded.
corm:	A short, vertical, thickened underground stem, functioning in food storage (more solid and without thickened leaves as in bulbs).
corolla:	Referring to the petals collectively.
corona:	Modified portions of the corolla or androecium appearing as small appendages between the corolla and androecium.
corymb:	A flat-topped inflorescence with outer pedicels progressively lengthened, the marginal flowers blooming first.
corymbose:	Arranged in a corymb.
cotyledon:	A leaf of an embryo of a seed.
creeping:	Growing along or below the ground surface and rooting at the nodes.
crenate:	Toothed with rounded teeth.
crested:	Having a projection or appendage on the summit.
crisped:	Irregularly wavy/curled (referring to leaf margins, hairs).
crown:	The base of a herbaceous perennial from which both roots and leafy growth are produced; the appendages in corolla throat; the leafy top of a tree.
cruciform:	Cross-shaped.
culm:	The stem of grasses, sedges and rushes.
cuneate:	Wedge-shaped.
cyme:	A flat-topped or convex inflorescence with the terminal (central) flower of each cluster blooming first.
deciduous:	Falling away at the completion of its function at the end of the season.
declined:	Obliquely curved downward.

decurrent:	Wings or margins (usually of leaves) extending down and adnate to the axis below the point of insertion.
deflexed:	Abruptly bent downward.
dehiscent:	Opening at maturity along a definate line.
digitate:	A compound leaf with leaflets arranged finger-like, radiating from a single attachment point.
dioecious:	Unisexual, the male and female reproductive structures on separate plants.
disarticulating:	Separating at a joint.
disc:	Generally, the enlarged flower receptacle; in composites, the central portion of a head, having tubular flowers.
discoid:	Resembling a head; in composites, referring to heads containing only tubular flowers.
dissected:	Deeply divided (below the middle) into narrow and usually several segments.
distichous:	In two vertical rows.
distinct:	Not united with adjacent similar organs.
divaricate:	Widely spreading and divergent from the axis.
divided:	Cleft to or below the midrib; in grasses, refers to collars separated by the midrib.
dorsal:	Referring to the back or outer surface of an organ; abaxial.
drupe:	Fruits similar to berries, having a fleshy middle ovary wall and thin outer skin but differing in that the inner ovary wall is hardened and bony (stone) enclosing 1-2 seeds.
druplet:	A small drupe (i.e. raspberry), usually one of a cluster.
early successional:	Pioneer plant species that are the first to establish on a disturbed site. These are native species usually also present in the climax vegetation, but decline in prominence as the natural plant succession allows climax species to establish.
emarginate:	With a small notch at the apex.
epigynous:	Perianth and stamens attached to the top of the ovary.
equitant:	Having edges rather than the surface facing the stem.
evergreen:	Leaves that remain green and attached throughout the winter.
excurrent:	The central axis continuing through and exserted as a short point.
exserted:	Extending beyond the surrounding organs.
farinose:	Covered with a white-mealy powder.
fascicle:	Arranged in a close cluster, usually referring to like organs.
fertile:	Capable of producing viable spores or seed.
fibrillose:	Having many slender fibers; shredded because of disintegration of thin tissue between persistent veins.
filament:	The lower stalk-like portion of a stamen.
filiform:	Very narrow and fine.

flaccid:	Weak and lax, not able to support its own weight.
fleshy:	Thickened and succulent, juicy.
floret:	A small flower, often one of a larger cluster as in grasses or composites.
follicle:	A dry pod-like fruit derived from a single carpel, splitting along the ventral side.
forage value:	The worth of a plant for ungulates depending upon a number of factors in combination: nutritional quality, palatability, quantity of forage produced, longevity, and primary distribution patterns. Forage value of a given species can vary from one location to the next, also depends upon class of livestock using the plants and season of use.
forbs:	Primarily broad-leaved flowering plants with net-like veins. For the purposes of simplifying identification, the category can be broadened to include those parallel-veined plants with brightly colored flowers (orchids, lilies, etc.).
gamopetalous:	Petals connate towards the base.
gametophyte:	The generation having "n" chromosomes and produces reproductive structures (gametes). Gametophytes in angiosperms are the embryo sac and pollen grain.
gibbous:	Abruptly swollen on one side, typically at the base of perianth.
glabrous:	Lacking hairs.
gland:	Small secreting structures either protruding, stalked or depressed, producing volatile oils or nectar which is often greasy or sticky.
glandular:	Having glands.
glaucous:	Covered with a fine waxy powder giving a white or bluish color.
glomerules:	Densely compacted clusters or heads.
glume:	One of the two empty (flowerless) bracts subtending a grass spikelet.
grain:	The fruit of grasses. See caryopsis.
grasses:	Plants which have hollow, jointed stems and leaves in two rows (ranks). Flowers are usually perfect, seeds borne between two scales (palea and lemma).
grass-like:	Plants that have narrow, parallel-veined leaves and resemble grasses. Stems are solid, often triangular and not jointed. The group includes, primarily, the sedge and rush families, and strictly speaking, can also include other monocots such as arrow-grass, lilies, etc.
grazing response:	The reaction of a plant species when it is grazed. This overall response varies also with soil, climate and habitat. The following groups are recognized: I. **Invader**: Primarily non-native plants which invade and replace the existing vegetation when it dies back, shows reduced vigor, or is eliminated due to disturbance and overgrazing. These species may or may not have grazing value. II. **Decreaser**: Plants that are major components of the original climax vegetation community. They tend to be highly productive but decline under heavy grazing pressure in prominence and vigor due to high palatability and often inferior reproductive capacity.

	III. **Increaser**: Native plants that increase in prominence and vigor and replace decreaser species when they decline. They tend to be less productive, less palatable, and often have superior reproductive adaptations. IV. **Increaser #1**: This includes a group of plants that usually increase on rangelands with moderately heavy grazing pressure, but with abuse and severe conditions, will ultimately decline and be replaced by more aggressive increaser species and non-natives.
gynoecium:	Carpels of a flower collectively.
habit:	The general appearance, growth manner and form of a plant.
habitat:	Natural environmental conditions and place in which a plant naturally occurs.
head:	A dense, compact inflorescence on a short receptacle or axis, strictly speaking, a racemose arrangement.
herb:	Annual to perennial plants with the above ground portion dying back to ground level at the end of each growing season.
herbaceous:	A herb; also referring to a leaf-like texture and color.
hermaphroditic:	A flower containing both sexes.
homosporous:	Producing only one type of spore, these becoming gametophytes that produce both male and female structures.
hyaline:	Pale, nearly transparent.
hypanthium:	The ring around the ovary (receptacle) formed by the lower perianth parts and androecium (this marginal), varying from saucer, cup, or tubular-shaped.
hypogynous:	Perianth and stamens attached to receptacle.
immersed:	Growing entirely under water.
imperfect:	Flowers lacking either stamens or pistils.
included:	Contained within, not projecting beyond other surrounding organs.
indicator species:	Plant species that reveal something about site or environmental traits or conditions. Includes references to range condition (high cover of rough fescue indicates good condition) and ecosite type (cloudberry indicates acidic bog ecosites).
Indusium:	Membranous cover (ferns) over the sorus.
inferior(ovary):	An epigynous flower, having the flower parts attached to a hypanthium that projects above the ovary.
inflorescence:	Referring to the type of flower arrangement on an axis; more generally, means flower cluster.
innovation:	A vegetative shoot arising from the base of a main stem.
internode:	The portion of stem between two adjacent nodes.
introduced plants:	Plants brought into an Ecoregion that were not part of the original population. These are primarily species not native to North America.
involucre:	A set of bracts subtending a flower cluster.
involute:	Having the margins rolled inward, concealing (or partially so) the upper (ventral) surface.

irregular(flower):	Having like organs (petals or sepals) dissimilar.
keel:	A sharp longitudinal ridge, as on some grass blades, some sepals etc; the lower two united petals in most *Leguminosae*.
lacerate:	Having the margins irregularly and sharply torn.
lanceolate:	Lance-shaped, similar to ovate (widest below middle and tapering above) but narrower, generally several times longer than broad. Base from narrowed to broader-rounded.
lateral:	Referring to the sides rather than base or apex.
latex:	The milky liquid produced by some plants containing particles of terpenes (hydrocarbons in volatile oils).
leaflet:	A single unit of a compound leaf.
legume:	Generally, refers to any plant in *Leguminosae*; also, the fruit of members of this family, consisting of a dry pod originating from a single carpel, dehiscent along two longitudinal sutures.
lemma:	The lower and usually larger of two bracts subtending each flower in *Gramineae*. Lemmas sterile or without palea in some species.
lenticels:	The small, raised spots on bark, consisting of loosely organized, mostly unsuberized cells.
ligule:	In *Compositae*, refers to the strap-shaped ray flowers; in grasses and sedges, the small thin appendage projecting from the inner leaf surface at the junction of sheath and blade.
limb:	The expanded part of a leaf or corolla, specifically, in gamopetalous corollas.
linear:	Having a very long, narrow shape, the sides essentially parallel.
lip:	One of the two main segments in a bilabiate (two-lipped) corolla; the upper (apparently lower) petal in orchids.
loment:	The fruit of some legumes in which the pod is constricted and jointed between 1-seeded segments.
lyrate:	Pinnate, the terminal lobe considerably larger, often rounded.
megaspore:	Larger spores which become the female gametophyte.
membranous:	Thin and soft, flexible, often transluscent.
microspore:	The small spores that give rise to the male gametophyte.
midrib:	The central vein.
moisture regimes:	The amount of moisture available for plant growth. Influenced by such factors as soil texture (internal drainage), slope (external drainage), total amounts of precipitation, topographic position, soil surface conditions. The following are recognized: • **Hydric**: Saturated conditions, water removal so slow that water table is permanently at the soil surface. • **Subhydric**: Soils wet to an extent that permanent water table is near the surface most of the year; discharge also likely. • **Hygric**: Soil moist for the majority of the growing season; permanent discharge areas.

- **Subhygric:** *Water removal slow enough to prevent drying for* extended periods during the growing season; precipitation and discharge water sources.
- **Mesic:** Moderate water removal following precipitation, soil moisture generally persisting for moderate periods of time.
- **Submesic:** Water removal moderately fast following precipitation, available for short periods following precipitation.
- **Subxeric:** Water removed rapidly following precipitation, but soil moisture persisting somewhat longer than in xeric conditions.
- **Xeric:** Water removal rapid, soil moist for brief periods following precipitation.
- **Veryxeric:** Water removal very rapid; soils dry most of the time following precipitation.

montane:	Located on the lower slopes of the mountains.
muriform:	Arranged like rows of bricks.
muskeg:	A sphagnum peatland with associated woody species such as *Larix laricina*, and especially *Picea mariana*.
mycorrhizal:	Having symbiotic fungus associated.
naked:	Lacking structures normally present on other like organs (i.e. naked buds lack scales).
native plants:	Plants that were originally present in a given plant community or Ecoregion; more broadly, plants native to North America.
nectary:	A gland that secretes nectar, usually located on a flower.
nerve:	A prominent vein (usually longitudinal) on an organ.
neutral:	A flower having neither stamens nor pistils.
node:	The point of attachment on a stem from which leaves, branches, and in some cases roots arise.
nodulose:	Having minute knobs.
nut:	A dry, indehiscent fruit with a hard wall, usually 1-seeded. Larger and harder than an achene.
nutlet:	A small nut; achene-like but hard-walled.
obcordate:	Heart-shaped but inverted, the point at the base.
oblanceolate:	Elongated and narrowed at both ends like lanceolate, but with the broadest part at or above the middle.
oblique:	Slanting and with unequal, varying widths.
oblong:	Elongate-rectangular, having sides more or less parallel, the base and apex rounded.
obovate:	Similar to ovate, but with the broadest part above the middle, the base cuneate, the apex broadly acute.
obsolete:	Essentially lacking; also refers to structures reduced such that they are barely detectable.
ocreae:	A sheath, derived from the stipule, that surrounds the stem just above the leaf base.

opposite:	Situated directly across from each other at a node; placed directly in front of rather than beside (alternate) another organ (i.e. stamens opposite sepals).
oval:	Broadly elliptical.
ovary:	Part of the pistil or carpel containing the ovules.
ovate:	Similar to oval, but broadest below the middle.
ovoid:	Egg-shaped.
palea:	The upper of the two bracts enclosing each flower in *Gramineae*. Absent in some species.
palmate:	Having 3-several nerves, branches, lobes or leaflets arising and radiating from one point.
panicle:	A branched (compound raceme) cluster of stalked flowers, with lowest branches longer and flowering first.
papilionaceous:	Flower with banner petal, 2 wing petals and 2 partly joined keel petals.
papillose:	Covered with minute, rounded-blunt projections (papillae).
pappus:	The modified calyx at the apex of the ovary and remaining attached to the achene, most commonly seen in many *Compositae*.
parasite (in botany):	A plant deriving its nutrients from another plant to which it is attached.
parted:	Deeply cut, from 1/2 way to near the base of midvein.
pedicel:	Stalk of individual flower.
pedicellate:	Borne on a pedicel.
peduncle:	Flower stalk or stalk of an inflorescence.
perennial:	A plant (or part) that lives more than two years.
perfect:	Flowers with both androecium and gynoecium, with or without perianth.
perianth:	All the sepals and petals collectively.
pericarp:	The wall of a fruit.
perigynium:	The sac-like bract enclosing the achene in *Carex*.
perigynous:	Perianth and stamens united below ovary.
persistent:	Remaining attached after normal function has been completed.
petal:	A member of the internal floral ring (corolla), often showy to attract pollinators, absent in some species.
petiole:	A leaf stalk.
phyllopodic:	Having lowest leaves with well developed blades rather than reduced and scale-like.
pinnae:	The primary segments in a pinnate leaf.
pinnate:	A compound leaf with leaflets arranged on both sides of an elongate axis.
pistil:	The female organ or gynoecium (includes stigma, style, ovary) of a flower, composed of one or more fused carpels, the number of carpels often evidenced by number of locules, placentae, stigmas or styles.

pistillate (flower):	A flower having pistil(s) only and no stamens.
pod:	Generally referring to any dry, dehiscent fruit.
pollen:	The pollen grains, or male gametophytes appearing as a yellow powder on the anthers.
pome:	A fruit from an inferior ovary, with a fleshy outer layer composed of the ripened ovary as well as including ripened receptacle and calyx. The inner papery or bony endocarp encloses the seeds.
prickle:	A spiny outgrowth from the epidermis.
primocane:	First-year canes in *Rubus*. Second year, reproductive canes referred to as floricanes.
pubescent:	Having hairs present, referring to all types of hairs.
pulvinus:	Cushion-like; also, a swelling at the base, such as on a leafstalk.
raceme:	An elongate unbranched inflorescence, of stalked flowers along a common axis.
rachilla:	The axis of the spikelets in grasses and some sedges.
rachis:	The main or central axis as in a compound leaf or raceme or spike.
radiate:	In *Compositae*, having ray flowers.
ray:	The ligule or ligulate flower in *Compositae*; a branch of some types of inflorescence, i.e. of an umbel.
receptacle:	The end of the stem (pedicel) to which the flower parts are attached; in *Compositae*, the end of the peduncle to which the flower head adheres.
recurved:	Abruptly bent backward.
regular:	Having all members of each organ type (petals, sepals etc.) similar in size, shape and orientation.
reticulate:	Forming a network of veins.
retrorse:	Directed downward or backward.
retuse:	With a small notch on a rounded leaf.
rhizome/ rhizomatous:	Having rhizomes.
rhizome/ rootstock:	An underground stem, horizontal to ascending, elongating and producing shoots and roots at intervals.
rib:	A prominent longitudinal vein.
roseate:	In the form of a rosette.
rosette:	A circular arrangement of like organs (i.e. leaves), often basal.
rudimentary:	Imperfectly and poorly developed but usually visible with close observation.
rugose (rugulose):	Wrinkled.
runner:	A slender, elongate prostrate stem or branch, rooting at the nodes; similar to stolon, but more slender.
salverform:	Corollas with a slender tube and abruptly spreading into a limb.
samara:	A dry, indehiscent, mostly 1-seeded fruit.
scabrous:	Roughened.

scale:	Generally applied to any small, thin, flat structure (i.e. the floral bracts in *Salix).*
scapose:	With flowers on a leafless stalk (scape).
scarious:	Thin, dry, pale, not green (like hyaline but less transparent).
sepal:	The outer (sometimes only) floral ring, collectively called the calyx. Only rarely are sepals considered absent and petals present.
septate:	Divided into partitions.
sericeous:	Hairs that tend to be long, appressed,silky.
sessile:	Stalkless.
setae:	Bristles.
setose:	Beset with bristles.
sheath:	The lower part of a leaf blade that clasps and encloses the stem.
shrub:	A woody plant, mostly less than 5 m. tall and usually with several stems.
silicle:	Essentially a silique, but short.
simple:	In leaves, the leaf all in one piece although it can be variously divided; in pistils, only having a single carpel.
smooth:	Lacking both any roughness and also pubescence.
soil orders:	Major groups of soils, varying in amount of horizon development, and each developed under specific vegetation and moisture conditions. • **Brunisolic**: Developed under a wide variety of conditions, less developed horizons than luvisols, often lacking AE, but more developed than regosols. Often iron-rich and reddish. • **Chernozemic**: Well developed horizons, the surface or topsoil darkened from decomposed organic matter; developed under grasslands. • **Gleysolic**: Soils developed under wet, waterlogged conditions. • **Luvisolic**: Soils developed under forest or forest/grassland transition, with the evidence of clay movement from the A to B horizon. • **Organic**: Soils developed from deep accumulations (more than 40-60 cm. deep) of decaying organic matter, sedges, moss and peat. • **Regosolic**: Little horizon development, least A and B development of all common soil orders. • **Solonetzic**: Sodium-enriched soil, with a very hard B horizon; saline soils.
sorus (sori):	A cluster of sporangia.
spathe:	A large solitary floral bract, subtending an inflorescence.
spike:	An inflorescence with sessile (subsessile) flowers on an elongated axis.
spikelet:	In *Gramineae*, the small unit of a flower, usually consisting of 2 glumes, palea and lemma, male and female reproductive structures; more generally, any small spike.

spine:	Strictly speaking, a sharp-pointed, stiff structure, considered to be a modified leaf or stipule; generally, any structure appearing as a spine.
spore:	A reproductive body, one-celled and without an embryo (as in ferns); in angiosperms, the first cell of the gametophyte (n) generation.
spur:	A hollow extension (appendage) from the calyx or corolla.
squarrose:	Abruptly curved-spreading from some point above the middle (i.e. in awns of some grasses).
stamen:	The microsporophyll in an angiosperm (male organ) consisting of an anther and filament, producing pollen.
staminate:	Flowers having stamens but no pistils.
staminodia:	Sterile stamens.
standard:	The banner, the large upper petal in papilionaceous flowers (i.e. legumes).
stellate:	Star-shaped, often referring to hairs.
sterile:	A plant that does not produce spores or seed.
stigma:	The portion of the style capable of receiving pollen, usually terminal.
stipitate:	Having a stipe or stalk.
stipulate:	Having stipules.
stipule:	One or two small appendages often present at the base of a leaf petiole.
stolon:	An elongate, creeping stem that roots at the nodes or apex, producing new plants. Usually not used for similar structures that are produced below the ground surface.
stoloniferous:	Producing stolons.
strict:	Straight and upright, not spreading or lax.
strobilus:	A cluster of scales forming a cone.
style:	The part of a pistil connecting stigma and ovary.
stylopodium:	The enlarged, disc-like expansion at the base of a style (common in *Umbelliferae*).
sub:	A prefix meaning almost/not quite, or beneath.
succulent:	Fleshy and juicy from the accumulation of water in the tissues.
sucker:	A shoot originating from below the soil surface.
superior (ovary):	Attached to the centre or summit of the receptacle, above other flower parts and free from them (can be hypogynous or perigynous).
taproot:	A prominent vertical root, thickened upward.
taxon:	A taxonomic entity (pl. taxa).
tendril:	A modified stem or leaf, slender and coiling-twining, enabling a plant to support itself on other vegetation or structures.
terete:	Rounded, not flattened in cross-section.
testa:	A seed coat, originating from the integuments of an ovule.
thallus (thallois):	Plant material without clear definition of leaves, stems ect.

thorn:	Strictly speaking, a modified stem, rather short, stiff, sharp-pointed, stouter than bristles or prickles or spines.
throat:	The junction of the tube and limb of a corolla.
tomentose:	Having a tomentum, or hairs that are woolly, tangled, matted.
torulose:	Cylindric, and having swollen structures at certain intervals.
trailing:	Prostrate but not rooting.
tree:	A woody plant mostly over 5 m. tall, mostly with single stems.
truncate:	Having the base or apex abruptly and transversely straight, as if cut off.
tuber:	Strictly speaking, a thickened part of a rhizome, functioning in food storage and also often in reproduction.
tubercle:	A small, rounded projection or swelling; in some *Cyperaceae*, the swollen, persistent style base.
tubular:	A tube-shaped corolla, with little expansion upward.
turbinate:	Top-shaped.
turion:	A small, bulb-like offset, seen in some species of *Epilobium*.
umbel:	A flower cluster (strictly speaking, a raceme) where all pedicels arise from a common point. A compound umbel has main branches again umbellately branched.
umbo:	A rounded elevation or protuberance on an organ (i.e. on the scales of pine cones).
undulate:	Wavy.
unisexual:	Imperfect, flowers with just stamens or ovaries, not both.
utricle:	A small, thin-walled, 1-seeded, somewhat inflated fruit.
valvate:	Having margins meeting but not overlapping; opening by valves.
valve:	One of the portions of the pod wall into which a capsule separates at maturity.
vein:	A vascular bundle.
venation:	Arrangement pattern of veins.
ventral:	The inside surface, the surface (adaxial) facing the axis.
verticil:	A whorl.
villose:	Hairs that are long, soft, kinky but not matted (as in tomentose).
viscid:	Sticky, greasy or glutinous.
whorl:	A group of more than 2 similar structures arising from the same node.
wing:	Any thin, flat, usually membranous expansion on a structure; in *Leguminosae*, one of the two lateral petals.
woolly:	Covered, usually densely so, with long, matted, tangled hairs.

References

Campbell, J.B.; Best, K.F.; Budd, A.C. 1966, 1973. *Ninety-nine Range Forage Plants of the Canadian Prairies*. Ministry of Supply and Services Canada. Publication 964.

Clark, L.J. 1976. *Wild Flowers of the Pacific Northwest*. Gray's Publishing Limited. Sidney, B.C.

Forest Service, U.S. Department of Agriculture. *Range Plant Handbook*.

Hitchcock, C.L., et al. 1955-69. *Vascular Plants of the Pacific Northwest*, Parts 1-5. University of Washington Press. Seattle.

Johnston, Alex. 1987. *Plants and the Blackfoot*. Lethbridge Historical Society. City of Lethbridge, Alberta.

Kingsbury, J.M. 1964. *Poisonous Plants of the United States and Canada*. Prentice-Hall, Inc. Englewood Cliffs, New Jersey.

Looman, J. 1983. *III Range and Forage Plants of the Canadian Prairies*. Research Branch, Agriculture Canada. Publication 1751.

Moss, E.H. 1983. *Flora of Alberta*, 2nd edition, revised by J.G. Packer. University of Toronto Press. Toronto, Ontario.

Scoggan, H.J. 1978-79. *The Flora of Canada*. National Museum of Natural Sciences Publications in Botany No. 7 (1-4). National Museums of Canada. Ottawa, Ontario.

Willard, Terry. 1992. *Edible and Medicinal Plants of the Rocky Mountains and Neighbouring Territories*. Wild Rose College of Natural Healing Ltd. Calgary, Alberta.

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